



5.26 Cumulative Impacts

5.26.1 Introduction

Cumulative impacts are defined by the Council on Environmental Quality (CEQ) Regulations as “*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.*” (CEQ Regulations) Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of others.

Direct impacts are defined by the CEQ Regulations as “*effects which are caused by the action and occur at the same time and place.*” (CEQ Regulations) For this project, an example of a direct impact would be the taking of a wetland for right-of-way for an interchange.

Indirect impacts are defined by the CEQ Regulations as “*effects which 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...*” (CEQ Regulations) For this project, an example of an indirect impact would be the development of farmland as a result of new access provided by the project.

The impacts of reasonably foreseeable future actions of others not associated with the I-69 project include the impacts of other federal, state, and private actions with the No Build Alternative for I-69. For this project, an example would be a forest located several miles away from I-69 that would be bought by a developer to construct a subdivision. This subdivision would not be associated with I-69, but it would be a reasonably foreseeable future action.

The assessment of cumulative impacts is required by the CEQ Regulations. These regulations ensure that the proposed I-69 project and other federal, state, and private actions will be evaluated with regard to cumulative impacts.

Since the publication of the DEIS, the following changes have been made to this section:

- Impact calculations have been updated to reflect the selection of variations, route shifts, and other changes, as described in Section 5.1.3.

5.26.2 Methodology

The methodology for determining cumulative impacts of the proposed I-69 project is described in detail in *Task 4.2 – Technical Report of Methods for Cumulative Effects Analysis for the I-69 Evansville to Indianapolis Study*. That technical report outlines an eleven-step process for conducting the cumulative impacts analysis.

1. Identify the significant cumulative effects issues associated with I-69.
2. Establish the geographic scope for the analysis.
3. Establish the time frame for the analysis.
4. Identify other actions affecting the resources, ecosystems, and human communities of concern.
5. Characterize the resources, ecosystems, and human communities identified in scoping and explain how they have historically changed.
6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
7. Define a baseline condition for the resources, ecosystems, and human communities.



8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human community.
9. Determine the magnitude and significance of cumulative effects by identifying the changes as a result of I-69.
10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative impacts.
11. Monitor the cumulative effects of the alternatives and provide documentation.

The eleven-step process was developed in accordance with “Considering Cumulative Effects Under the National Environmental Policy Act” (Council on Environmental Quality, 1997). The direct and indirect impacts of the various alternatives were calculated using the Geographic Information System (GIS) and the economic and transportation planning modeling combination.

In the mid-1990s, INDOT undertook a significant effort to develop analytical procedures designed to assess the transportation and economic impacts of large corridor investments. This effort resulted in the *Major Corridor Investment Benefit Analysis System* (MCIBAS). MCIBAS is a suite of programs and technical procedures, which consists of the *Indiana Statewide Travel Demand Model* (ISTDM) linked by post-processors and analytical procedures to a regional econometric simulation model. ISTDM is a computer model that forecasts traffic flow throughout the highway network given a proposed change or changes to the existing system.

In the early phases of this Tier 1 EIS, significant improvements were made to both MCIBAS and ISTDM. These improvements included:

1. The expansion of ISTDM into the four neighboring states to allow for improved testing/modeling of transportation improvements that might draw traffic from neighboring states;
2. The addition of minor collectors and some local roads into the ISTDM transportation network to permit improved estimates of traffic flows;
3. The ability to input traffic into the statewide network that would be generated by the completion of I-69 at the national level;
4. The ability to output some economic and transportation data for five regions within the 26-county Study Area;
5. The development of a “feedback loop” from these regions to the starting point of ISTDM to determine the effects of the new population and employment “induced” by an improved highway corridor on the transportation network; and
6. The conversion of new population and employment into estimates of new land development.

It should be noted that the combination of these improvements – including the national I-69 traffic, the feedback loop and land use estimates – represents a significant step beyond the usual state-of-the-practice for modeling planned transportation improvements. Typically, travel demand models will take into account only the effects of changes in destination choices and route diversions resulting from a prospective improvement to the transportation system (e.g., added speeds and capacity to an existing road and/or the construction of a new road). Most travel demand models are not integrated with an economic model, nor do they allow for the feedback of “generated” or “induced” demand resulting from new development that would occur solely because the highway is built or improved.

Both national I-69 and highway-induced demand (per the feedback loop) were included in a set of year 2025 model runs for each alternative. The incremental increases in VMT are attributable to the national I-69 project and demand induced by new economic development within Indiana. The results of this scenario were utilized for purposes of documenting impacts on air quality, noise, indirect land use and traffic in order to predict the maximum potential impacts to the resources in the Study Area upon completion of I-69 nationally.



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This information was computed for each of the five economic analysis regions. These five regions are shown on Figure 5.26-1 and include:

1. Indianapolis and western and southern counties (Hendricks, Johnson, Marion, and Morgan counties);
2. Bloomington (Monroe County);
3. Greater Terre Haute (Clay and Vigo counties);
4. Greater Evansville (Gibson, Posey, Vanderburgh, and Warrick counties);
5. Rural Southwest Indiana (Brown, Crawford, Daviess, Dubois, Greene, Knox, Lawrence, Martin, Orange, Owen, Perry, Pike, Putnam, Spencer, and Sullivan counties).

In addition to computing the indirect impacts for the economic regions, the indirect impacts of the I-69 alternatives were computed for groups of potential interchanges. This was done using models developed from a national study of commercial development at rural and small town Interstate exits (Hartgen and Kim, 1998). Using these models, forecasts of commercial activity were computed and the activity was converted into acres using standard land use densities.

This methodology uses a combination of transportation and economic models to forecast population and employment activity. This activity is converted into land use acres so that the impacts upon environmental resources can be determined.

5.26.3 Analysis

The following analysis presents each of the eleven steps and discusses the results of the cumulative impacts.

1. Identify the significant cumulative effects issues associated with I-69 - For the proposed I-69 project, three major resources, ecosystems and human communities were identified that are being analyzed for cumulative impacts. These three resources are farmland, forests, and wetlands. They were selected based upon their importance in Southwestern Indiana as well as input from various resource agencies. These resources were discussed at a November 27, 2001 meeting with various resource agencies. (See Appendix Y, *Agency Coordination Materials*, and November 27, 2001 review meeting.)

Initially a fourth resource, threatened and endangered species, was considered for the cumulative impacts analysis. As information on threatened and endangered species was obtained, it became apparent that threatened and endangered species are very wetland dependent. Of the threatened and endangered species, 93 of 120 (78%) of the threatened and endangered species (including watch list species) are fully or partially wetland dependent. Wetlands make up 4-5% of the surface area of Indiana and such high occurrences of threatened and endangered species for wetlands shows the value and importance of wetland habitats to Indiana's biota. Of the remaining 27 threatened and endangered species, 10 are forest species.

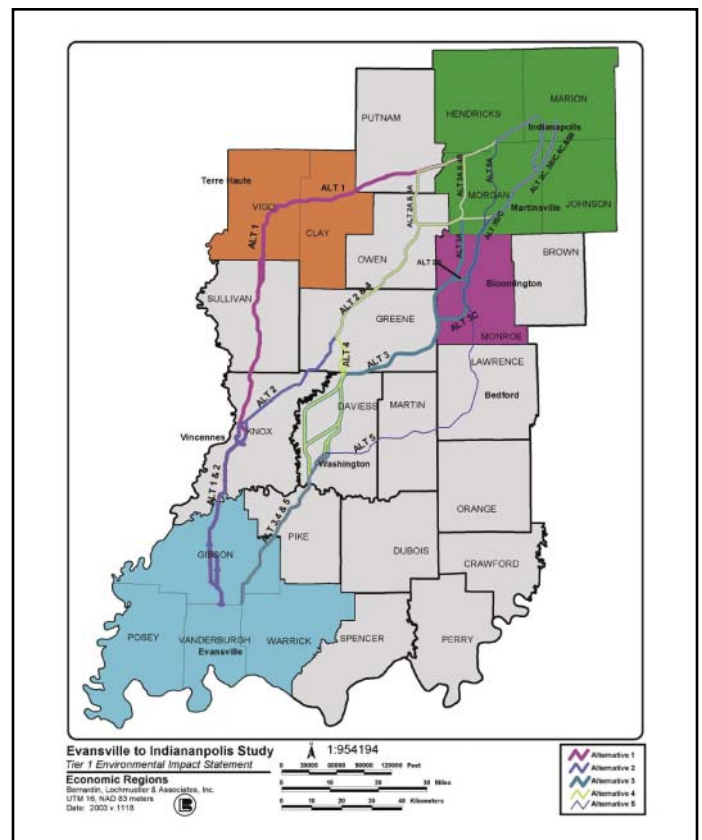


Figure 5.26-1: Economic Regions within the Study Area



These two ecosystems make up the majority of the environmentally sensitive habitat for threatened and endangered species in Indiana. This direct correlation would apply to 103 of 120 threatened and endangered species (86%) in Indiana. As a result of this information, projections for threatened and endangered species would follow trend lines for wetlands and forests. Since wetlands and forests provide excellent correlation to threatened and endangered species, threatened and endangered species were not analyzed separately from wetlands and forests.

2. Establish the geographic scope for the analysis - The geographic scope of the cumulative impacts analysis is at its broadest level the entire State of Indiana. The baseline information on the three resources covered the entire state. The direct and indirect analysis was computed using the economic and the transportation models (see previously discussed methodology for a description of the models) to produce information for the total 26-county Study Area and for five separate economic regions within that Study Area. Cumulative impacts covered these five regions. Then, direct and indirect impacts were computed for interchanges and groups of interchanges along particular I-69 alternatives.

3. Establish the time frame for the analysis - The time period studied for this cumulative impacts analysis includes past years to present day. Impacts were forecasted to the reasonably foreseeable year of 2025. Forecasting impacts beyond the year 2025 is speculative. Available information has guided the extent of the past analysis. Information for farmland was available back to 1900. Information for forests and wetlands were estimated back 200 years. For the future analysis, the year 2025 is also the future analysis year for the economic modeling and the transportation modeling.

4. Identify other actions affecting the resources, ecosystems, and human communities of concern - The analysis of cumulative impacts for the proposed I-69 project considered the cumulative effects on the resources of farmland, forests, and wetlands. This included I-69 (direct and indirect impacts) as well as impacts from other major federal, state and private actions in the Study Area not related to I-69. The major projects identified as other actions to be considered are shown in Figure 5.26-2 and include:

- Proposed United States Penitentiary at Terre Haute
- SR 641 – Terre Haute Bypass from US 41 to I-70
- Patoka River National Wildlife Refuge
- US 231 relocation from the Ohio River to I-64 in Spencer County
- Indianapolis Airport Expansion
- US 231- I-64 to SR 56 (commonly called the Jasper/Huntingburg Bypass)
- Beanblossom Bottoms Nature Preserve
- I-69 from Evansville, Indiana south to Henderson, Kentucky
- Goose Pond – Natural Resources Conservation Service project
- SR 37 Added Travel lanes from I-465 to SR 144
- SR 37 Upgrade Project in Bloomington



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- I-70 Added Travel lanes from the Illinois/ Indiana State line to SR 267 outside Indianapolis
- Residential development along SR 37 corridor

Proposed United States Penitentiary at Terre Haute – This project would involve the construction and operation of a United States Penitentiary to consist of 960 beds along with a Special Confinement Unit consisting of 100-120 beds. This project is slated for development within the grounds of the existing Terre Haute Penitentiary. No additional land will need to be acquired (United States Department of Justice, 2000).

SR 641 Terre Haute Bypass from US 41 to I-70 - INDOT is constructing a new four-lane, divided, access controlled highway as a bypass of Terre Haute in Vigo County. A Final Environmental Impact Statement (FEIS) was signed on January 3, 2000 (United States Department of Transportation, 2000). As a four-lane, divided, access controlled highway, the mainline of SR 641 would be used for part of Alternative 1 of the proposed I-69 project. This project would take 466 acres of land including 261 acres of farmland, 107 acres of forests, and 30 acres of wetlands. Twenty residences, two tenant-occupied units, two businesses, one vacant commercial location, two part-time farms and five farms would have been relocated.

Patoka River National Wildlife Refuge - The U.S. Fish and Wildlife Service has established the Patoka River National Wildlife Refuge in Gibson and Pike Counties in Southwest Indiana. A FEIS was prepared in July of 1994 for this project. The U.S. Fish and Wildlife Service proposes to acquire 22,083 acres of land from willing sellers. Full acquisition may take 20 years or more. Currently the refuge consists of approximately 5,211 acres. The projected land use changes are to convert upland farmland and bottomland farmland into upland forests and bottomland-forested wetlands. Upland forests would increase by approximately 2,163 acres and bottomland forested wetlands would increase by approximately 4,108 acres (United States Fish and Wildlife Service, 1994).

US 231 Relocation from the Ohio River to I-64 in Spencer County - INDOT and the Kentucky Transportation Cabinet have constructed a new bridge over the Ohio River. INDOT will construct, primarily on new alignment, US 231 from the Ohio River to I-64 as a four-lane, divided, partial access controlled highway. It will be part of a transportation corridor that connects Owensboro, Kentucky with Jasper and Huntingburg in Indiana. US 231 currently is a two-lane highway with uncontrolled access. The new bridge over the Ohio River is open to traffic. The US 231 project acquired approximately 1,110 acres of land including 432 acres of farmland, 264 acres of forests, and 15 acres of wetlands. The relocations include 23 residences (United States Department of Transportation, 1999).

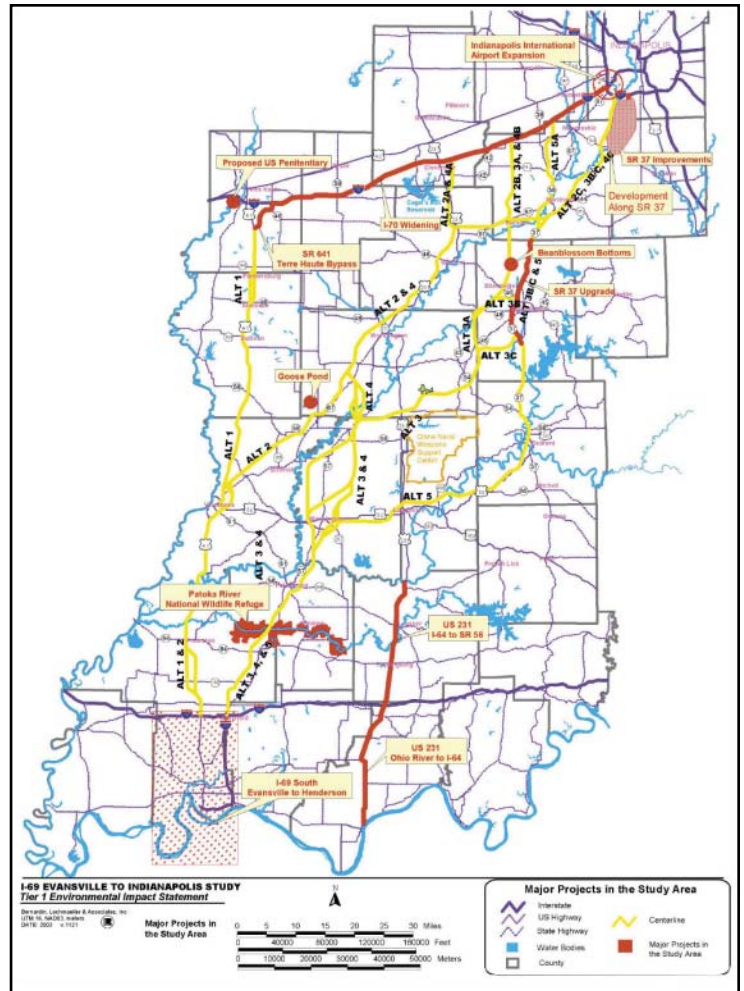


Figure 5.26-2: Major Projects in the Study Area



Indianapolis Airport Expansion - The Indianapolis Airport Authority, INDOT, the City of Indianapolis, and Hendricks County are part of a task force working to improve access to the Indianapolis International Airport by improving I-70 beginning west of SR 267 and continuing to I-465. The environmental studies have been completed and the project is under construction. The project will take 570 acres of land, including 464 acres of farmland, 62 acres of forests, and approximately one acre of wetlands. There will be three relocations (United States Department of Transportation, 2001). A portion of I-70 is being relocated south of its present location by several hundred feet. A new interchange is under construction at Six Points Road on the west edge of the airport. The maximum number of lanes for I-70 for this project is 10-12 lanes including Interstate lanes and collector-distributor lanes. Various alternatives of the I-69 project would use this reconstructed portion of I-70. The number of lanes proposed for the I-70 project could handle I-69 and its proposed traffic. An accompanying project is the Six Points Road Interchange. This project involves an improvement to Six Points Road from I-70 north to US 40 and the extension of Six Points Road southeast to SR 67. The Additional Information Document (the FEIS re-evaluation) was completed on April 2, 2002. The project would take approximately 510 acres of land including 385 acres of farmland, 9.23 acres of wetlands, and 47.8 acres of forests. There were three single family residences and ten mobile homes relocated (United States Department of Transportation, 2002).

US 231- I-64 to SR 56 (commonly called the Jasper/Huntingburg Bypass) - INDOT and FHWA are preparing an EIS for the improvement of US 231 from I-64 to SR 56 in Dubois County. This project is commonly called the Jasper/Huntingburg Bypass because the alternatives include bypasses of both Jasper and Huntingburg.

Beanblossom Bottoms Nature Preserve – The Sycamore Land Trust and the Muscatatuck National Wildlife Refuge have purchased property along Beanblossom Creek in Monroe County creating this Nature Preserve. Beanblossom Bottoms is considered a High Biodiversity Area by The Nature Conservancy. Nearly 520 acres are protected. The Beanblossom Bottoms Nature Preserve, Restle Natural Area (Muscatatuck National Wildlife Refuge), Grieco, Trout, Brummett, Baugh, and Anderson properties are all land trust properties in this complex.

I-69 from Evansville south to Henderson, Kentucky - The National I-69 project connects Canada to Mexico via the United States. Along the National I-69 corridor, sections of independent utility were identified. Section 3 of the National I-69 project is a section that extends from Evansville, Indiana to Indianapolis, Indiana. Section 4 of the National I-69 project is a section that extends from Evansville, Indiana south to Henderson, Kentucky. A Draft Environmental Impact Statement (DEIS) is currently being written for this section.

FHWA, INDOT, and the Kentucky Transportation Cabinet are jointly preparing the DEIS for the I-69 project from Evansville to Henderson. This project begins at I-64 (the southern terminus of I-69 from Indianapolis to Evansville) and continues south across the Ohio River and ends south of Henderson. There are currently three build alternatives under consideration. The highway is proposed to be four to six lanes with a median and total control of access. See Section 5.6, *Joint Development* for more information.

Goose Pond –Indiana claims one of the nation's largest Wetlands Reserve Program (WRP) easements with a 7,068-acre site in Greene County. This privately-owned easement area, historically known as Goose Pond, was cleared for farming in the late 1800s. The shallow glacial lakebed provides a natural resting site for waterfowl during spring and fall migrations. The dominant silty clay loam soils limit drainage of the property. Natural Resources Conservation Service personnel are currently evaluating the site to plan the restoration work. Goose Pond is currently under construction. Practices will likely include tile cuts, ditch plugs, water control structures, low-level dikes, tree planting, and warm and cool season grass plantings. The restored site will provide a significant resting and nesting site for a variety of migratory waterfowl, shorebirds, and other wetland dependent species. INDOT is contributing to this project by raising the grade of an existing road, which will significantly expand the wetland area.



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SR 37 added travel lanes from I-465 to SR 144 – This project involves constructing an additional lane on SR 37 in each direction from I-465 south to SR 144, a distance of approximately 10 miles. This project was in INDOT's 2000-2025 Statewide Long Range Transportation Plan but has since been replaced with the Preferred Alternative 3C.

SR 37 upgrade project in Bloomington – SR 37 is proposed to be upgraded to a freeway facility from Victor Pike to the Morgan County Line, a distance of approximately 24 miles. This project is included in the Bloomington/Monroe County Year 2025 Transportation Plan, which was amended shortly before publication of this FEIS to reflect the selection of Preferred Alternative 3C.

I-70 from SR 641 in Terre Haute to SR 267 outside Indianapolis - This project involves constructing an additional lane on I-70 from SR 641 in Terre Haute to SR 267 where the Indianapolis Airport Improvements begin. When constructed, I-70 will be at least a six-lane highway. This project is included in INDOT's 2000-2025 Statewide Long Range Transportation Plan.

Table 5.26-1 shows the estimated impacts for adding a lane to I-70 from SR 641 to SR 267. When adding a lane to I-70, approximately 360 feet of right-of-way will be needed to accommodate the entire facility. Currently, the right-of-way varies along I-70 from 200 feet to over 450 feet. The additional right-of-way in areas with less than 360 feet was estimated and the impacts shown in Table 5.26-1.

The total length of the I-70 improvement would be 55 miles. The total acres impacted would be approximately 450 acres. Farmland would be approximately 300 acres while forests would account for 100 acres. The additional right-of-way needed from farmland and forests would be in long narrow sections 50-75 feet wide. Since I-70 is an east-west facility, these long, narrow strips of right-of-way should create a minimal impact for point rows for farmers. In forest areas, these strips of right-of-way would impact the edges of existing forests.

Approximately 10 acres of wetlands along existing I-70 could be impacted by adding travel lanes. These impacted wetlands would be in the median of the existing I-70 and along the edges of the existing right-of-way. There would need to be mitigation to replace the wetlands lost for right-of-way needs.

The Chinook State Fishing Area is located just west of the SR 59 interchange with I-70. This site may be a Section 4(f) resource depending upon use. There are no sites listed on the National Register of Historic Places that would be impacted by the I-70 widening. There are two potentially eligible historic properties that would need to be analyzed under the Section 106 process.

There are no potential hazardous material sites that would be impacted by the I-70 widening. Approximately 41 streams would be impacted by the widening of I-70. Bridges would need to be widened and culverts extended. Approximately 10 miles of latitudinal encroachment and four miles of longitudinal encroachment for floodplains would result from this project.

Federal threatened and endangered species, such as the Indiana bat, may be impacted. For state threatened and endangered species, one species, the badger, has been sited along I-70. No residential or commercial relocations are estimated to occur as a result of the widening of I-70.

Many of the alternatives for this I-69 project would utilize a portion of an improved I-70 with additional lanes. As a committed project in INDOT's 2000-2025 Statewide Long Range Transportation Plan, environmental documentation will be prepared for this I-70 additional lanes project.

Residential development along SR 37 – Several areas along SR 37 between Bloomington and Indianapolis are currently experiencing rapid development. Much of this development involves the conversion of farmland to residential



| Table 5.26-1: Estimated Impacts for an Additional Lane on I-70 from SR 641 to SR 267 | |
|--|---|
| Criteria | I-70 – SR 641 to SR 267 |
| Total Length | 55 miles |
| Total Acres Impacted | 450 acres |
| Interchanges – Existing and Proposed | 7 existing, no proposed |
| Farmland | 300 acres |
| Forests | 100 acres |
| Wetlands | 10 acres |
| Potential Section 4(f) Resources | Chinook State Fishing Area |
| Section 106 Resources | 2 potentially eligible historic properties |
| Potential Hazardous Material Sites | No sites |
| Total Streams Crossed | 41 |
| Floodplains Crossed | 10 miles of latitudinal encroachment and 4 miles of longitudinal encroachment |
| Federal Threatened & Endangered Species Occurrences | 0 |
| State Threatened & Endangered Species Occurrences | 1 |
| Potential Relocations – Homes and Businesses | No homes and no businesses |

or commercial use. An example of this trend is the large Southern Dunes housing development at SR 37 and Southport Road. See Figures 5.26-2a and 5.26-2b. For further information see Section 5.3.3.

5. Characterize the resources, ecosystems, and human communities identified in scoping and explain how they have historically changed - Baseline reports on farmland, forests, and wetlands have been completed and are found in the Appendices F, G, and H for this document. These reports discuss the past and present status of the resources. The baseline reports also forecast reasonably foreseeable future trends and their anticipated impacts upon the resource.

Farmland - The baseline report in Appendix F shows that Indiana, farmland has declined from 21,619,623 acres in 1900 to 15,111,022 acres in 1997. From 1982 to 1997, the acreage for Indiana has declined 7.2 %. For farmland in Southwest Indiana, the figures show that farmland has declined from 3,869,542 acres in 1982 to 3,563,505 acres in 1997 (see Figure 5.26-3). This is a 7.9% loss of farmland in 15 years. While farmland acres are declining, production has been and continues to increase. From 1982 to 2001, corn yields have increased in Indiana from 126 to 156 bushels per acre, an increase of almost 24%. Likewise soybeans have increased from 38.5 to 49 bushels per acre during this time period, an increase of over 27%.

Forests – The forest baseline report in Appendix G shows that in Indiana the past history of forest loss since 1800 began to change in 1950 and possibly reached a plateau by the 1990s. Almost 200 years ago, forests covered about 85% of Indiana’s land area, a total of approximately 19,500,000 acres. By 1900, forests were down to approximately 1,500,000 acres in Indiana. From 1950 to 1998, forests increased from 4,140,000 to 4,501,300 acres, an increase of 8.7%. While forests have increased over the past 50 years, the volume of trees growing on timberland acres has substantially increased. The average timberland volume per acre has increased from 683 cubic feet per acre to

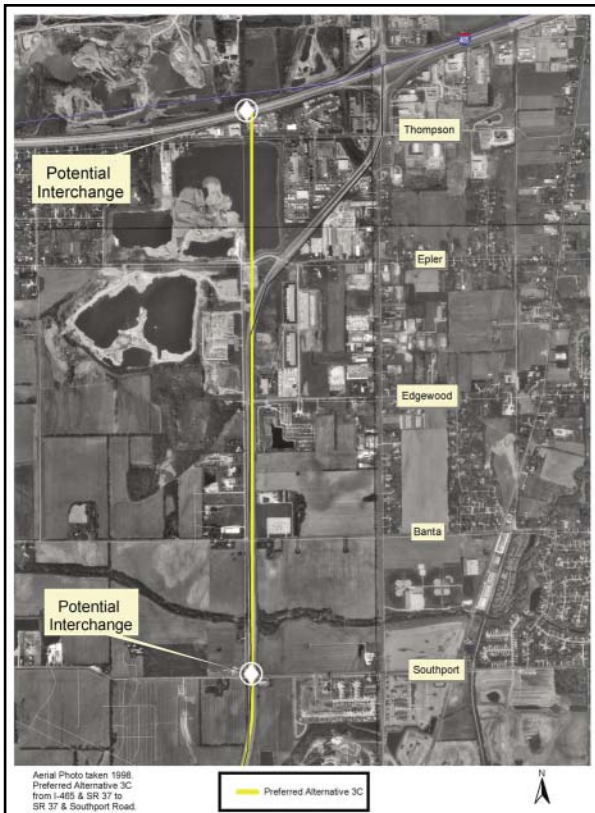


Figure 5.26-2a 1998 Aerial of SR 37 from Southport Road to I-465

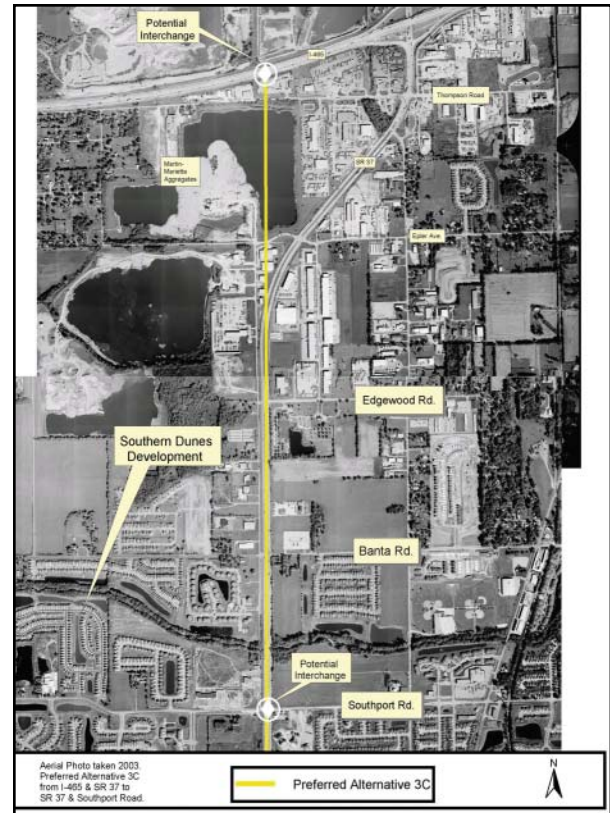


Figure 5.26-2b 2003 Aerial of SR 37 from Southport Road to I-465

1,589 cubic feet per acre. This is an increase of 133% over 50 years. In Southwest Indiana, 1950 to 1998 showed an increase in forests from 1,904,000 to 2,026,500 acres, an increase of 6.4%. However, the period from 1986 to 1998 showed a slight decline in total acreage which suggests that forest acreage may have reached a plateau (see Figure 5.26-4).

Wetlands – The wetlands baseline report in Appendix H shows the history of wetlands has been a loss from an estimated 5,600,000 acres to a low of 267,100 acres with a resurgence up to a present day level of 813,032 acres. There were an estimated 5,600,000 acres of wetland in Indiana prior to European settlement (around 1780). By 1906, the wetland acreage in Indiana was 625,000 acres. In 1954, only 267,100 acres remained. The changes in Federal and State policies starting in the 1970s changed that downward trend. By the mid-1980s, wetlands had grown to 813,032 acres according to the

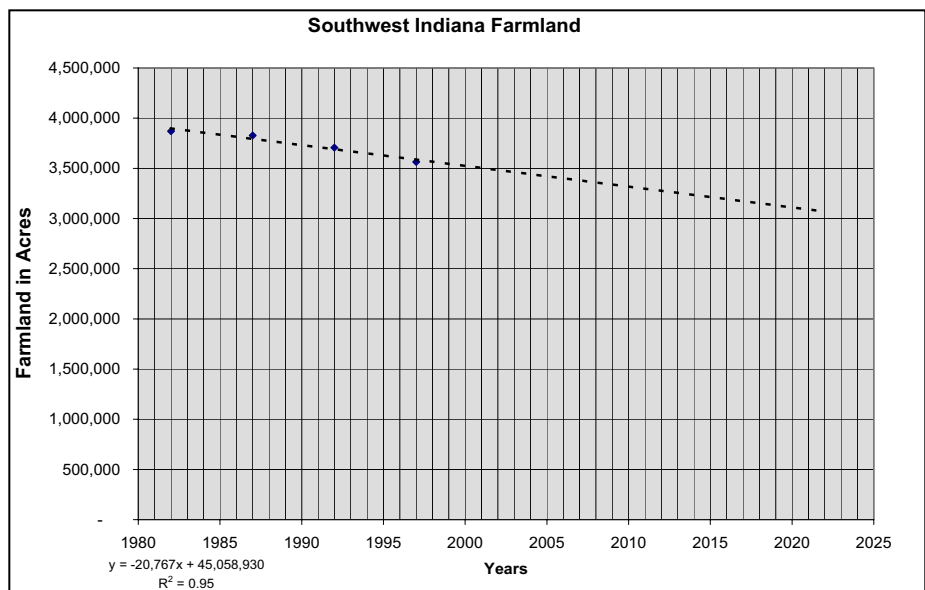


Figure 5.26-3: Southwest Indiana Farmland



most recent and complete analysis by the Department of Natural Resources in 1991 (see Figure 5.26-5). Southwestern Indiana accounts for approximately 245,817 acres.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds –

Farmland - The conversion of farmland to urban development has been the result of several demographic trends including more single person households, smaller households, bigger commercial facilities and larger, single level industrial plants. As Appendix F shows, the rate of loss of farmland from 1982 to 1997 for Indiana is approximately 78,883 acres per year. While some of this loss reflected population and employment growth, the stresses on farmland are the demographic trends toward more single person households and smaller households. These trends mean more housing units and more land but not more people (Turner, 1996). In commercial development, the trend is toward bigger stores in suburban areas. In industrial development, the trend is toward larger, single story plants (Jerry Glassberg, 1998).

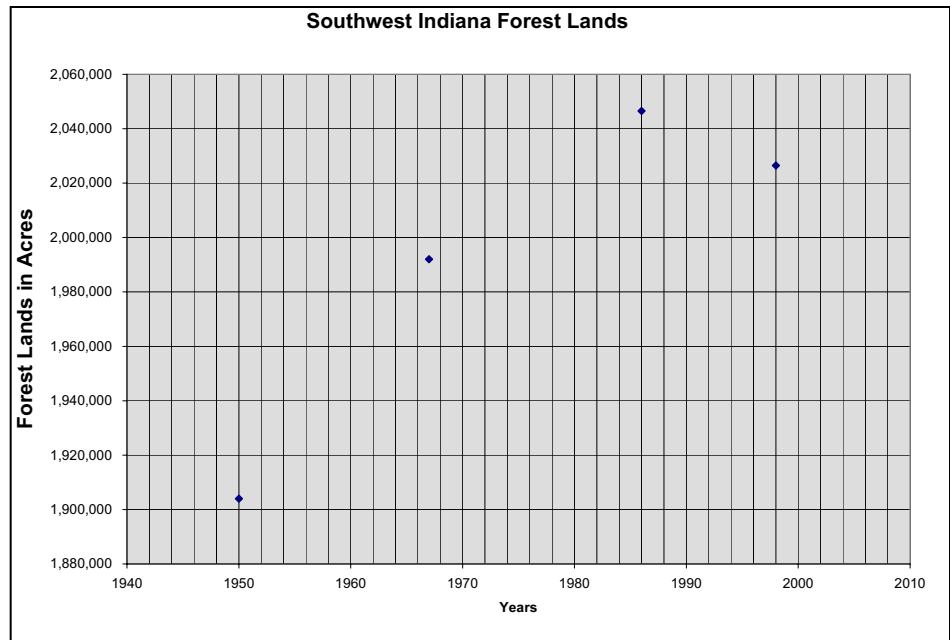


Figure 5.26-4: Southwest Indiana Forest Lands

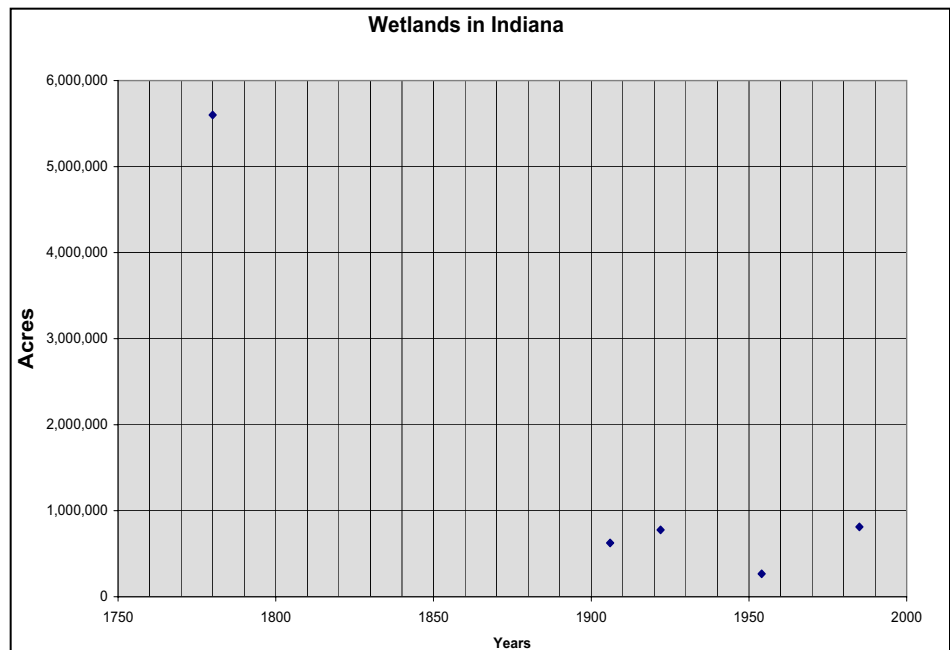


Figure 5.26-5: Wetlands in Indiana

In light of these trends, one of the goals of the Natural Resources Conservation Service's Farmland Protection Program is to protect and slow the loss of farmland. Preservation strategies concentrate efforts to direct industrial, residential, and commercial growth to areas less suitable for farming.

Forests - Over the past 50 years, forests have been increasing in Indiana. Changing land management practices are contributing to this trend of increased forestation as some cropland and pasture are allowed to revert to forest and existing narrow wooded strips are allowed to expand. The increase in forests due to these changing practices has



been greater than losses from the conversion of forests to agriculture, urban/suburban expansion, and other uses in the past 50 years.

The stress on forests is the fragmentation of forest areas. Fragmentation of forests may affect core forest habitat, which in turn may adversely affect a variety of species living in this core habitat. Wildlife dependent upon this habitat will be affected if these forests decline or continue to become fragmented. The goal of the Forest Service of the U.S. Department of Agriculture is to continue the conservation programs and protect the forests. Southwest Indiana has the most continuous forests in the state (Schmidt, Hansen, and Solomakos, 1998).

Wetlands – Even though the functions of wetlands are well known, the U.S. Fish and Wildlife Service estimates that Indiana has lost millions of acres of wetlands. Current wetland figures show 813,032 acres remaining by the mid-1980s according to the most recent and complete analysis by the Department of Natural Resources in 1991. The Indiana Wetlands Conservation Plan states that with the majority of wetland resources having been lost or converted, all remaining wetlands are important and should be considered important for conservation (Indiana Department of Natural Resources, 1996).

The stresses on wetlands include impacts to water quality, alterations of water levels, and other surface disturbances. As a result, the biological diversity of Indiana’s natural wetlands has been degraded. The seriousness of this degradation is best recognized by the large numbers of plants and animals that occur naturally in wetlands listed as either endangered, threatened, or of special concern by the Indiana Department of Natural Resources (Indiana Department of Natural Resources, 1994). Of all wetland types, the palustrine forested wetlands (bottomland hardwoods) have been identified in Indiana as the state wetland priority type (Indiana Department of Natural Resources, 1988).

7. Define a baseline condition for the resources, ecosystems, and human communities

Farmland - The future trend for farmland in Indiana and Southwest Indiana is continued loss of land. A linear regression analysis for land in farms for Indiana from 1900 to 1997 shows a significant downward trend (see Figure 5.26-6). At this rate, the land in farms in Indiana for 2025 would be approximately 13,570,000 acres, representing a loss of 10.2% of the total farmland since 1997. The future trend for land in farms for Southwest Indiana also shows a significant downward trend (see Figure 5.26-3). At this rate, the land in farms in Southwest Indiana would be approximately 3,483,400 acres in 2002 and 3,005,800 acres in the year 2025. This would be a decline of approximately 477,600 acres, or approximately 20,800 acres per year.

Forests - The future trend for forests in Indiana and Southwest Indiana seems to indicate that the amount of forest loss is reaching a plateau. A linear regression analysis for forests is less accurate as a forecast tool as a result of the recent fluctuations in acreages for Southwest Indiana.

Information from the Forest Service indicates that we have achieved a balance between forest interests and

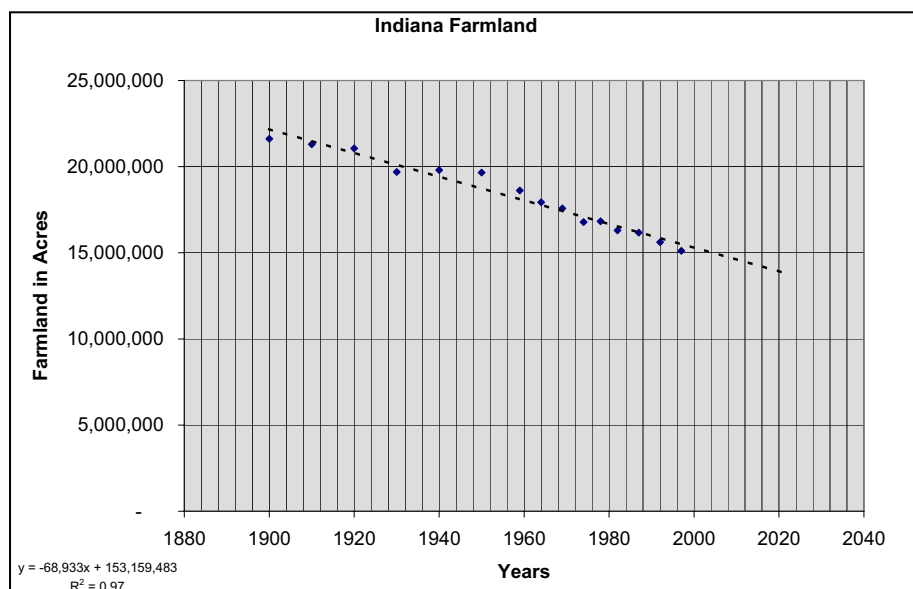


Figure 5.26-6: Indiana Farmland



users (see Figure 5.26-4). With such a balance, there is expected to be little change in the amount of forests in the foreseeable future.

Wetlands – Recent legislation in the 1970s and 1980s coupled with the need for permits in wetland areas has reversed the downward trend in wetlands. While trend line analysis for Indiana did not result in accurate forecast information (see Figure 5.26-5), the goals at both the federal level and the state level are “no net loss of wetlands”. Conversations with officials at the state level indicate that this statement currently provides the best information as to the future direction of wetlands.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human community – The three major resources considered in this cumulative effects analysis are farmland, forests, and wetlands. The most often cause-and-effect issue is land conversion from farmland, forests, and wetlands to other uses of which the primary use is urbanization. Transportation projects can influence this land use conversion process.

9. Determine the magnitude and significance of cumulative effects by identifying the changes as a result of I-69 – The methodology section of this cumulative effects analysis presented the steps in generating the direct and indirect impacts of the various alternatives. These impacts were calculated using the GIS and the economic and transportation planning modeling combination.

The results are shown in a set of three tables. Each table shows the current acreage of the resource, the direct impacts to the resource, the indirect impacts to the resource, and the other impacts (determined by the trend analysis). The total of these impacts results in a forecasted 2025 acreage for the resource. The impacts upon farmland, forest, and wetlands are shown in Table 5.26-2, Table 5.26-3, and Table 5.26-4, respectively. The supporting information for these three tables is in Appendix Q.

Farmland

Table 5.26-2 and Figure 5.26-7 show that the I-69 alternatives, including both direct and indirect impacts, account for at most 6,280 (Alternative 4C) acres or 1.3% of the cumulative farmland loss that is forecasted to occur in the Study Area between 2002 and 2025.¹ The loss from direct and indirect impacts of the I-69 alternatives accounts for at most 6,280 acres or 0.2% of the total estimated 2002 farmland acreage for Southwest Indiana.²

The Preferred Alternative 3C will have direct impacts (4,470 acres) and indirect impacts (710 – 900 acres) on farmland. These impacts amount to 1.1% of the cumulative farmland loss and 0.2% of the total farmland acreage for Southwest Indiana.

Approximately 477,600 acres of farmland will be lost to production from 2002 to 2025. For the I-69 alternatives, the direct farmland loss ranges from 1,410 acres (Alternative 1) to 5,460 acres (Alternative 4C). The indirect farmland loss ranges from 420 acres (Alternative 1) to 900 acres (Alternative 2C and Alternative 3C). Figure 5.26-7 shows that the loss from direct and indirect impacts for all the alternatives is a small percentage of the total loss from other actions.

Table 5.26-2 and Figure 5.26-8 total the direct and indirect impacts on farmland for the alternatives to the year 2025. The indirect impacts include all development in Southwest Indiana estimated to be caused by or result from I-69

¹ 5,460 acres of direct impact + 820 acres of indirect impact/477,600 acres to be lost.

² 5,460 acres of direct impact + 820 acres of indirect impact/3,483,000 total acres.



| Alternative 1 | | Alternative 2 | | | Alternative 3 | | | Alternative 4 | | | Alternative 5 | |
|--|-----------------|-----------------|-----------------|-----------------|---------------|-------------|-------------|---------------|-----------|-------------|---------------|-------------|
| | | A | B | C | A | B | C | A | B | C | A | B |
| Estimated 2002 Farmland Acreage for Southwest Indiana | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 | 3,483,000 |
| Direct Impacts to Farmland | (1,410 – 1,940) | (3,780 – 4,040) | (4,250 – 4,510) | (4,550 – 4,810) | (4,770) | (4,650) | (4,470) | (4,690) | (5,160) | (5,460) | (4,420) | (4,120) |
| Indirect Impacts to Farmland | (420-490) | (525-595) | (580-650) | (735 – 900) | (595-665) | (720 – 870) | (710 – 900) | (510-575) | (530-595) | (715 – 820) | (615 – 750) | (690 – 840) |
| Other Impacts from Trend Analysis | (477,600) | (477,600) | (477,600) | (477,600) | (477,600) | (477,600) | (477,600) | (477,600) | (477,600) | (477,600) | (477,600) | (477,600) |
| Forecasted 2025 Farmland Acreage for Southwest Indiana | 3,003,000 | 3,001,000 | 3,001,000 | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 2,999,000 | 3,001,000 | 3,001,000 |

through the year 2025. With the addition of the indirect impacts on farmland, Alternative 1 remains with the least impacts with 1,830 to 2,430 acres of farmland impacted. Alternative 4C had the most farmland impacts with 6,175 to 6,280 acres of farmland impacted. With the exception of Alternative 2A (4,305 – 4,645 acres of farmland lost), the farmland acreage impacts for the remaining alternatives are estimated to range from 4,830 to 5,755 acres impacted.

The land development trends that have led to the stresses upon farmland will continue in the reasonably foreseeable future. The conversion of farmland to accommodate homes on bigger tracts of land, bigger stores with bigger inventories, and bigger single story industrial plants will continue. Commercial development in suburban areas will continue to be more attractive to developers than in downtown areas.

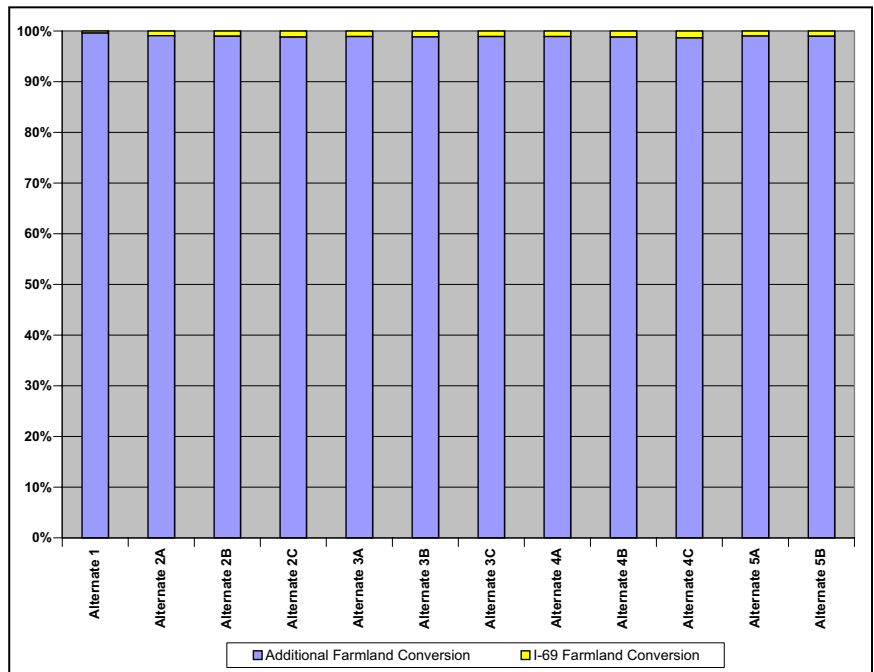


Figure 5.26-7: Cumulative Impacts of I-69 upon Farmland



Forests

Table 5.26-3 shows that the I-69 alternatives, including both direct and indirect impacts, account for between 185 acres (Alternative 1) and 1,955 acres (Alternative 5A) of forests taken for I-69. Since the trend shows forests reaching a plateau, it is anticipated that while some other actions will take forest acres, this will be offset by other actions that increase forest acres (for example, the gains in forest acres from the Patoka River National Wildlife Refuge). This loss from direct and indirect impacts of the I-69 alternatives accounts for at most 1,955 acres or 0.1% of the total forest acreage in 1998 for Southwest Indiana.³

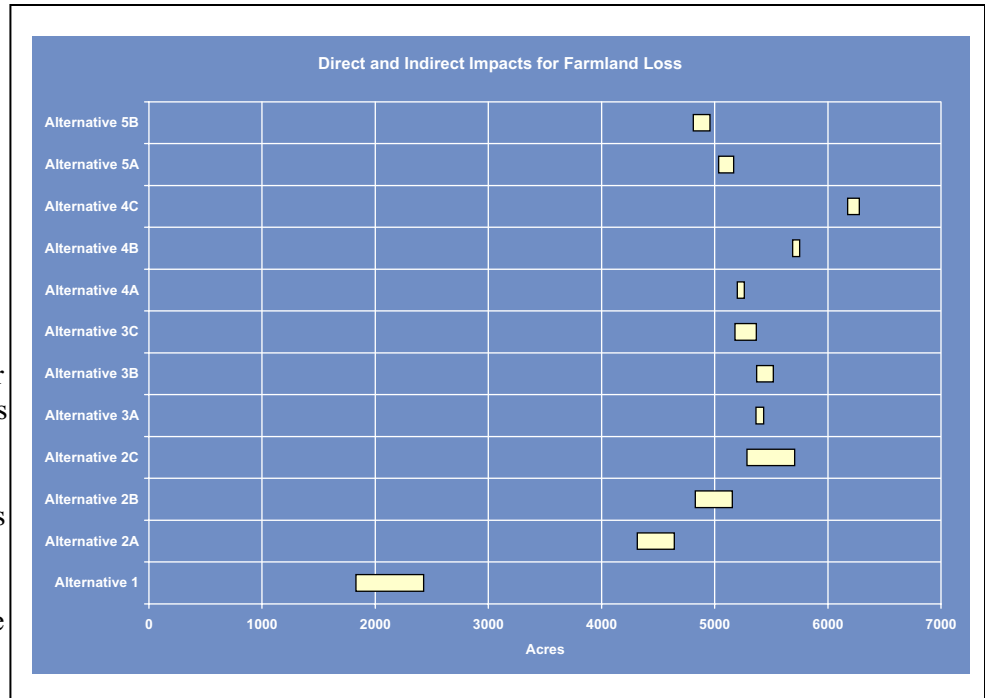


Figure 5.26-8: Direct and Indirect Impacts for Farmland Loss for I-69

The Preferred Alternative 3C will have direct impacts (1,150 acres) and indirect impacts (325 - 400 acres) on forests. These impacts amount to 0.1% of the total forest acreage in 1998 for Southwest Indiana.

Table 5.26-3 and Figure 5.26-9 total the direct and indirect impacts on forests for the alternatives to the year 2025. The indirect impacts include all development in Southwest Indiana estimated to result from I-69 through the year 2025. With the addition of the indirect impacts on forests, Alternative 1 remains with the least impacts with 185 to 310 acres of forest impacted. Figure 5.26-8 shows Alternative 5A impacting the most acres of forest with 1,865 to 1,955 acres impacted. Alternatives 3A, 3B, and 5B are close to Alternative 5A with impacts ranging from 1,600 to 1,865 acres. The indirect impacts upon forests range from Alternative 1 with 70 to 140 acres impacted to Alternative 5B with 340 to 455 acres impacted.

Alternatives 5A and 5B result in impacts to state and federally owned lands in the Martin State Forest, the Tincer Special Area of the Hoosier National Forest and the Morgan-Monroe State Forest. Appendix Q shows the impacts by economic region and for groups of interchanges in these regions. Alternatives 5A and 5B are estimated to have indirect impacts for future land development at interchanges in Martin County and in Lawrence County in Region 5, interchanges in Monroe County and around Bloomington in Region 2, and interchanges in Morgan County in Region 1. These interchange locations will be in close proximity to these state and federally owned lands.

The loss of these forest acres will result in forest fragmentation and could affect state and federally owned forests in Martin State Forest, the Tincer Special Area of the Hoosier National Forest and the Morgan-Monroe State Forest.

³ 1,515 acres of direct impacts + 440 acres of indirect impacts / 2,026,500 total acres.



| | Alternative 1 | Alternative 2 | | | Alternative 3 | | | Alternative 4 | | | Alternative 5 | |
|---|---------------|---------------|---------------|-------------|---------------|-----------|-----------|---------------|-----------|-----------|---------------|-----------|
| | | A | B | C | A | B | C | A | B | C | A | B |
| 1998 Forest Acreage for Southwest Indiana | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 | 2,026,500 |
| Direct Impacts to Forests | (115 – 170) | (900 – 915) | (995 – 1,010) | (850 – 865) | (1,565) | (1,290) | (1,150) | (870) | (965) | (820) | (1,515) | (1,280) |
| Indirect Impacts to Forests | (70-140) | (125-185) | (190-205) | (215-285) | (245-300) | (310-380) | (325-400) | (145-200) | (150-205) | (220-290) | (350-440) | (340-455) |
| Other Impacts from Trend Analysis | - | - | - | - | - | - | - | - | - | - | - | - |
| Estimated 2025 Forest Acreage for Southwest Indiana | 2,026,000 | 2,025,000 | 2,025,000 | 2,025,000 | 2,025,000 | 2,025,000 | 2,025,000 | 2,025,000 | 2,025,000 | 2,025,000 | 2,025,000 | 2,025,000 |

Wetlands

Table 5.26-4 shows that the I-69 alternatives, including both direct and indirect impacts, account for between 22 acres (Alternative 1) and 150 acres (Alternative 5A) of wetlands taken for I-69. With federal and state policies of “no net loss of wetlands”, the impacts of other actions should not involve the net loss of wetlands. In fact, the Patoka River National Wildlife Refuge should result in the increase in wetlands in Southwest Indiana.

This loss from direct and indirect impacts of the I-69 alternatives accounts for at most 150 acres or 0.06% of the total wetland acreage in the mid-1980s for Southwest Indiana.⁴

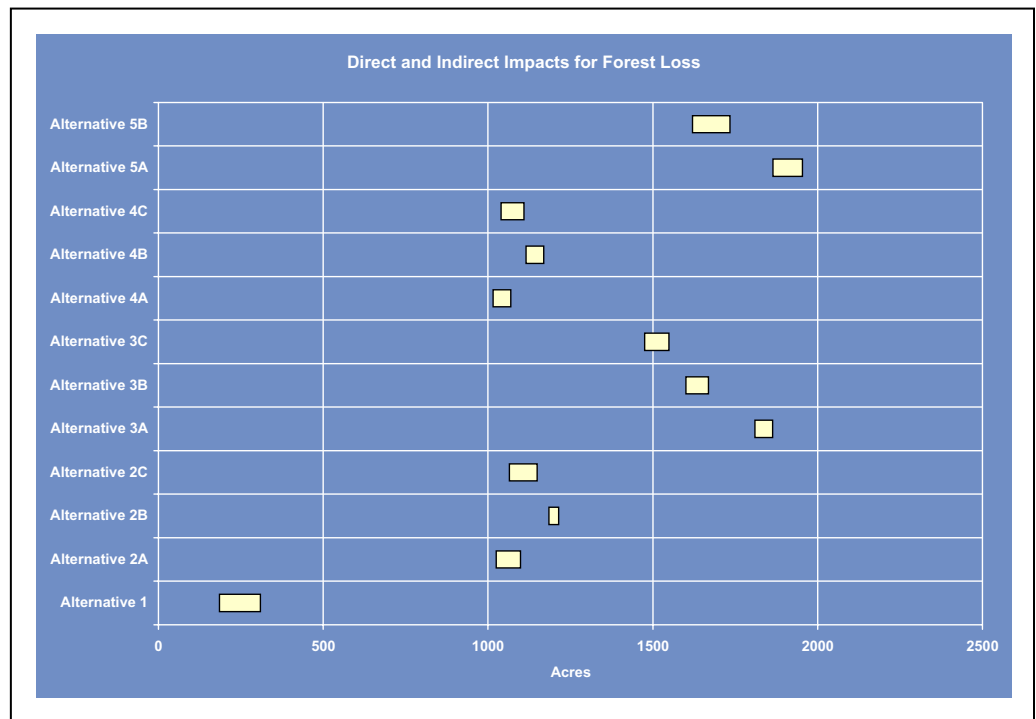


Figure 5.26-9: Direct and Indirect Forest Loss Impacts for I-69

⁴ 105 acres of direct impacts + 45 acres of indirect impacts / 245,817 total acres



The Preferred Alternative 3C will have direct impacts (75 acres) and indirect impacts (10 - 30 acres) on wetlands. These impacts amount to 0.04% of the total wetland acreage in the mid-1980s for Southwest Indiana.

Table 5.26-4 and Figure 5.26-10 total the direct and indirect impacts on wetlands for the alternatives to the year 2025. The indirect impacts include all development in Southwest Indiana estimated to be caused by or result from I-69 through the year 2025. With the addition of the indirect impacts, Alternative 1 remains with the least wetland impacts with 22 to 65 acres of wetland impacted.

Alternative 5A remains with the greatest wetland impacts with 125 to 150 acres of wetland impacted. Looking at Figure 5.26-10, many of the alternatives fall in the same range with 65 to 135 acres impacted. With the exception of Alternatives 5A and 5B, all of the alternatives have indirect impacts on wetlands within a range of 0 to 35 acres. Alternatives 5A and 5B have between 15 and 45 acres of wetlands indirectly impacted.

The major wetland complex that will be impacted is the Patoka River National Wildlife Refuge. Coordination with the U.S. Fish and Wildlife Service has worked to minimize the impacts to the refuge from the I-69 alternatives that cross the refuge. The refuge is part of the other actions that are considered in this cumulative analysis. According

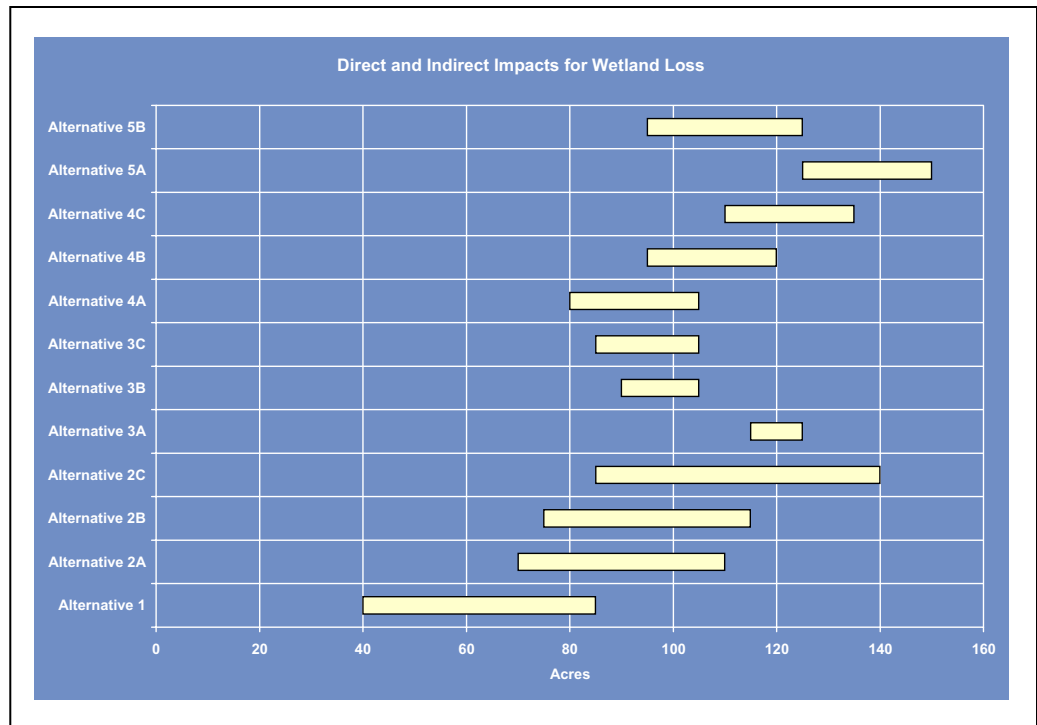


Figure 5.26-10: Direct and Indirect Impacts for Wetland Loss for I-69

| | Alternative 1 | Alternative 2 | | | Alternative 3 | | | Alternative 4 | | | Alternative 5 | |
|--|---------------|---------------|---------|----------|---------------|---------|---------|---------------|---------|---------|---------------|---------|
| | | 2A | 2B | 2C | 3A | 3B | 3C | 4A | 4B | 4C | 5A | 5B |
| Mid 1980's Wetland Acreage for Southwest Indiana | 245,817 | 245,817 | 245,817 | 245,817 | 245,817 | 245,817 | 245,817 | 245,817 | 245,817 | 245,817 | 245,817 | 245,817 |
| Direct Impacts to Wetlands | 22 - 40 | 60 - 75 | 65 - 85 | 80 - 100 | 105 | 80 | 75 | 75 | 90 | 105 | 105 | 80 |
| Indirect Impacts to Wetlands | 0-25 | 5-30 | 5-25 | 5-35 | 10-20 | 10-25 | 10-30 | 5-30 | 5-30 | 5-30 | 20-45 | 15-45 |
| Other Impacts from Trend Analysis | - | - | - | - | - | - | - | - | - | - | - | - |
| Estimated 2025 Wetland Acreage for Southwest Indiana | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 |



to the FEIS for the refuge, approximately 4,105 acres of wetlands will be created as part of the refuge (United States Fish and Wildlife Service, 1994).

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative impacts – The alternatives impacting the Patoka River National Wildlife Refuge have been modified in consultation with the U.S. Fish and Wildlife Service to minimize the impacts to the refuge. Alternative 3B has been adjusted to minimize the impacts to the Beanblossom Bottoms Nature Preserve; however, the Preferred Alternative is Alternative 3C.

Impacts to farmland may be reduced by working with local officials concerning land use controls.

11. Monitor the cumulative effects of the alternatives and provide documentation – The Tier 2 NEPA studies for the various sections of independent utility will identify the location of the alignment that will be designed and constructed.

5.26.4 Summary

Preferred Alternative 3C, including both direct and indirect impacts, accounts for:

- 5,370 acres or 1.1% of the cumulative farmland loss forecasted to occur in Southwest Indiana between 2002 and 2025
- 5,370 acres or 0.2% of the total farmland acreage (as of 2002) for Southwest Indiana
- 1,550 acres or 0.1% of the total forest acreage (as of 1998) for Southwest Indiana
- 105 acres or 0.04% of the total wetland acreage (as of the mid-1980s) for Southwest Indiana.

Preferred Alternative 3C would directly impact approximately 4,470 acres of farmland. Indirect impacts to farmland resulting from Preferred Alternative 3C are estimated to be between 710 to 900 acres. For forestlands, Preferred Alternative 3C would directly impact approximately 1,150 acres and indirectly impact between 325 and 400 acres. For wetlands, Preferred Alternative 3C would directly impact approximately 75 acres and indirectly impact between 10 and 30 acres.



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