

# 4 Environmental Consequences

This chapter assesses the environmental impacts expected to occur from the implementation of alternatives A or B, as described in chapter 2. Environmental impacts are analyzed by issues for each alternative and appear in the same order as discussed in Chapter 2.

## EFFECTS ON THE BIOLOGICAL ENVIRONMENT

This section describes the estimated effects on wildlife habitat and water and soil resources of carrying out alternatives A and B.

### ***Wildlife Habitat—Alternative A (No Action)***

Current Service programs such as Partners for Fish and Wildlife (PFW) would continue within the conservation project area. The Service would continue to work cooperatively with landowners to voluntarily improve habitat on private land.

Although efforts by the Service's PFW program and partners would continue to enhance habitat on some private lands, degradation of resources on many unprotected lands would continue. These potential impacts could result in the further decline of migratory birds, resident wildlife, and listed species. Wildlife species, particularly grassland birds, would continue to decline due to habitat fragmentation resulting from intensification of agricultural processes, conversion to forest cover, or residential and commercial development. Stream quality could be become degraded from development, impacting the Topeka shiner, Neosho madtom, and mollusk species.

Subsequent effects, including those listed below, would likely impact wildlife:

- Fragmentation of habitat and loss of migration corridors for wildlife
- Reduction or elimination of grazing and prescribed fire used to maintain intact tallgrass prairie
- Increased non-native and invasive species

### **Habitat Fragmentation**

Habitat fragmentation can be defined as a “landscape-level process in which a specific habitat is

progressively sub-divided into smaller, geometrically altered, and more isolated fragments as a result of both natural and human activities, and this process involves changes in landscape composition, structure, and function at many scales and occurs on a backdrop of a natural patch mosaic created by changing landforms and natural disturbances (McGarigal and McComb 1999).”

Habitat loss and fragmentation is the greatest threat to the Flint Hills tallgrass ecosystem, and is much more likely to occur under this alternative. Fragmentation is primarily caused by commercial, industrial, and residential development, which reduces the use of prescribed fire and results in the encroachment of trees. Habitat loss and fragmentation may also act synergistically with climate change and other factors to magnify deleterious effects to species and ecosystems by limiting the ability of species to adapt or migrate (Hill et al. 2006, Ewers and Didham 2006). Habitat loss and fragmentation are considered the most significant threat to global biodiversity, with infrastructure development playing a key role (Wilcove et al. 1998).

Flint Hills grassland species are dependent on open expanses of intact tallgrass prairie habitat. As a non-migratory bird species, the greater prairie-chicken must be able to meet all life requirements within a relatively limited area of prairie, and are therefore useful as an umbrella species for evaluating habitat for other grassland bird species. Habitat requirements of prairie-chickens are thought to magnify the impact of fragmentation and other agents of habitat change (Leitner et al. 1991, Knick and Rotenberry 2000), and declining grouse populations have been linked to broad spatial landscape changes (Woodward et al. 2001, Fuhlendorf et al. 2002). Patten et al. (2005) suggested that landscape fragmentation would result in a need for greater home range size for greater prairie-chickens, which could decrease survivorship due to increased predation, collisions, and energy expenditures. It is essential to maintain contiguous habitat for the maintenance of prairie grouse populations in order to provide connectivity of multiple leks (Woodward et al. 2001); as much as 15,000 acres is required to support a single prairie-chicken lek (Hagen and Giesen 2005). Intact grassland habitats like the Flint Hills may not be able to sustain prairie-chicken and other grassland-interior specialist species if fragmentation goes unchecked.

A 6-year study in southwestern Kansas found that lesser prairie-chickens strongly avoid certain anthropogenic features, resulting in sizable areas of habitat being rendered less suitable (Pitman 2005, Robel et al. 2004). Similarly, Braun et al. (2002) found that greater sage-grouse abandoned portions of their habitats affected by oil production activity, including areas adjacent to regularly traveled oil field service roads. Edges of habitat caused by roads may create an avenue for predators and the spread of invasive weeds (Hansen and Clevenger 2005, Lockwood et al. 2007). Robel et al. (2002). Observed mean avoidance buffers (mean distances based on 90% avoidance by 187 nesting lesser prairie-chicken hens) of 1,191 feet from transmission lines, 581 feet from oil or gas wellheads, 4,114 feet from buildings, 1,007 feet from center pivot irrigation fields, and 2,579 feet from either side of improved roads (95 feet from 2-track ranch trails) were measured. Likewise, 18,866 radio telemetry locations of lesser prairie-chickens revealed strong avoidance behavior (95% absence ratio) from human intrusions; for example, prairie-chickens avoided buildings and transmission lines by mean distances of 1,978 and 2,081 feet, respectively. Large arrays of turbines may also serve as a barrier to birds (Drewitt and Langston 2006), potentially altering migratory corridors, local flight paths, and immigration and emigration among populations. The disturbance of tall foreign structures and noise may also disrupt mating vocalizations. Lesser prairie-chicken vocalizations, for example, are high frequency (approximately 750 Hertz) and antiphonal, and thus are easily drowned out by peripheral noise (Bain and Farley 2002). Braun et al. (2002) reported that Gunnison and greater sage-grouse were particularly susceptible to noise near leks.

Many more acres of land would likely be developed for residential home sites or isolated commercial uses, as economic forces change in the future. The project area has more than 3,000,000 privately owned acres, with the majority remaining in large ranch ownership. Under Kansas state law, the subdivision process is not difficult. Moreover, with no county zoning in place, small lot subdivisions are possible. The Flint Hills prairie is essentially surrounded by urbanized areas and areas of commercial development. Residential development around Wichita, Topeka, Manhattan, and Emporia has been claiming thousands of acres of tallgrass prairie annually. Long-time family ranches are beginning to be sold and are commanding high prices for residential properties.

Habitat and travel corridors for key geographic and functional biological linkages can be lost, and wildlife populations isolated, once an area is fragmented by subdivisions or other development. Studies have shown that an increase in urbanization and associated fragmentation has a negative effect on the abundance of grassland nesting birds. In one study, all species of song birds reviewed decreased with an increase in urbanization. For two species, the horned lark

and Savanna sparrow, no birds were observed in plots where 4–7% of the surrounding landscape was urbanized, suggesting a high sensitivity to urbanization and associated fragmentation of habitat. Grasshopper sparrows declined abruptly in abundance at approximately 10% urbanization (Bock et al. 1999).

Additionally, human settlement results in the introduction of trees which spread and provide habitat for non-native perching birds which exacerbate the rate of spread. Woody species, such as the red cedar, have been increasing in the Flint Hills since around 1970 (Smith et al. 1978). Research has shown that the increase in woody species is a result of reduction in the use of fire, along with human population growth and resultant land fragmentation (Hoch 2000). Habitat loss, fragmentation, and the resulting genetic isolation constitute the most serious threats to grassland biological diversity. These factors have been repeatedly shown to decrease species richness. Ecologists use two theoretical frameworks to explain this phenomenon: the theory of island biogeography and metapopulation dynamics. The relationship of fragmentation and lost diversity holds especially true in grassland ecosystems, where many grassland interior specialists, such as the prairie-chicken, require large expanses of relatively unfragmented habitat. (Brian Obermeyer, Flint Hills project coordinator, The Nature Conservancy, Topeka, Kansas; personal communication).

Wind power offers an emission-free source of electricity and lacks many of the environmental hazards associated with fossil fuels (Therkelsen et al. 1998). However, impacts to grassland-dependent wildlife habitat resulting from wind infrastructure are of particular concern in the Flint Hills due to the high potential for wind energy development. Development of wind power poses a high risk of habitat fragmentation for the Flint Hills because economically viable wind resource areas and conservation priority areas show a high level of geographic congruence.



*Red cedar invasion of prairie.*

Prairie-chickens are prairie-interior specialists, exhibit high site fidelity, require extensive grasslands and open horizons (Giesen 1994, Fuhlendorf et al. 2002), and are thought to be especially vulnerable to wind energy development. Robel (2002) predicted utility scale (1.5 megawatt) wind turbines would create an approximate 1-mile radius avoidance zone for greater prairie-chicken nesting and brood rearing activities. Based on this estimate, he projected that a proposed 100 megawatt wind facility in the Flint Hills of Kansas would render 15,000–17,990 acres of very good to excellent tallgrass prairie habitat unsuitable for nesting and brood-rearing purposes; the actual project size of this proposed project was roughly half this area.

### Other Fragmentation Issues

Today's Flint Hills tallgrass prairie landscape is considered by ecologists to be a "fire climax" system. When tallgrass prairie remains unburned for ten or more years it begins to convert to woodlands (Abrams and Gibson 1991) and will become unsuitable habitat for the many grassland species currently associated with the tallgrass prairie region.

With the currently increasing encroachment of residential and commercial development, and fragmentation by road networks it is becoming much more difficult to use the combination of prescribed fire and grazing necessary to maintain a healthy mosaic of tallgrass prairie habitat in a fire climax ecosystem like the Flint Hills. Increased development could make prescribed fire activities more difficult to implement, allowing tree encroachment in the surrounding areas around these developments.

No action would result in loss of opportunity to protect important tallgrass prairie and riparian habitats. Without the protection of private land with conservation easements, the future of tallgrass habitat for wildlife in the project area would be uncertain. The increased likelihood of development in the Flint Hills under alternative A, and the resultant fragmentation, would further exacerbate grassland bird declines and ultimately speed the listing of grassland-dependent species.

### **Wildlife Habitat—Alternative B (Proposed Action)**

Through the proposed conservation easement program, up to 1,100,000 acres of privately owned native tallgrass prairie habitat would be added to the approximately 35,000 acres within the project area that already have some level of protection through the efforts of other conservation organizations. The Service would work with other agencies and organizations seeking tallgrass prairie habitat conservation. This would have long-term positive impacts on wildlife habitat and result in the long

term conservation of migratory birds, threatened and endangered species, native plants, and the overall biological diversity of the Flint Hills tallgrass prairie. Through the PFW program, the management practices on easement lands could potentially be improved to provide better tallgrass prairie habitat for grassland species.

### Habitat Fragmentation

Establishing the Flint Hills Legacy Conservation Area would provide for the conservation of up to 1,100,000 acres of the only remaining landscape-scale expression of tallgrass prairie. This program would provide protection and prevent the fragmentation of essential tallgrass habitat, and prairie-dependent resident and migratory wildlife species.

Under the proposed action, areas with FHLCA conservation easements would not permit commercial and industrial-scale development, including wind energy development, new residential, oil and gas developments, or commercial aggregate extraction projects on easement lands due to the serious fragmentation effects on grassland species associated with these types of activities and their associated infrastructure (wind towers, roads, and transmission lines). Perpetual conservation easements would restrict new development in order to prevent the resultant habitat fragmentation, and thereby protect key biological linkages, facilitate wildlife movement, and provide for wildlife habitat requirements. Additionally, the use of conservation easements would support management activities such as prescribed fire, grazing, and other efforts to control the spread of woody vegetation and invasive weeds. Retaining large, unfragmented areas would also greatly reduce potential for human-wildlife conflicts.

Because the conservation area currently benefits from minimal habitat fragmentation, the project seeks to retain the intact status of the habitat. The habitat loss and fragmentation from roads, power lines, turbines, and other associated infrastructure that is probably the most pressing issue for wind projects sited in relatively intact, natural landscapes (Kuvlesky et al. 2007, McDonald et al. 2009) would be greatly reduced in the project area under this alternative.

The Service supports the development of renewable energy (see Secretarial Order 3285) in areas that have minimal impacts to the trust wildlife resources on *public* lands. However, available research shows the grassland interior species of the Flint Hills to be especially vulnerable to infrastructure from various forms of development. Service Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines (USFWS 2003) recommends avoiding "placing turbines in habitat known to be occupied by prairie grouse or other species that exhibit extreme avoidance of vertical features or structural habitat

fragmentation. In known prairie grouse habitat, avoid placing turbines within 5 miles of known leks.” While wind turbines may be compatible with some wildlife species in other areas of Kansas, the Flint Hills tallgrass prairie dependent species have demonstrated sensitivity to vertical structures and habitat fragmentation.

Compatible agricultural practices such as livestock grazing, prescribed burning, and haying would continue, while sod busting (breaking of native grassland) would be prohibited. Easements would maximize the connectivity with other protected grasslands and decrease the negative impacts of habitat fragmentation on grassland birds.

For easements that have been put in place on land where the owner has not sold or leased the mineral or subsurface estates (oil and gas deposits), the U.S. Fish and Wildlife Service easement would be senior to any subsurface interests later acquired by a developer. Since development of the mineral estate could significantly impact the resources the Service is attempting to protect, the Service would require a developer to access minerals from off-site. Surface occupancy of the easement for mineral development would be prohibited.

In many places where the subsurface estate has been severed, including along the Flint Hills, the landowner does not own the subsurface rights; this means that the easement that the Service acquires from the landowner is subject to the outstanding mineral rights. In those cases, the Service would work on a voluntary basis with the developer to minimize surface degradation and would seek restoration of disturbed sites.

Conserving the unfragmented nature of North America’s interior grassland habitats, which have steadily become more fragmented by a variety of human-induced influences (Samson and Knopf 1994, Knopf and Samson 1997), is essential for the long-term conservation of grassland-dependent wildlife.

The Flint Hills region provides habitat integral to larger national conservation efforts. The region is a north-south migration linkage for many migratory birds. Wildlife species dependent on tallgrass habitat are being increasingly compressed into a shrinking ecosystem, a factor contributing to the rapid decrease of grassland birds; the fastest declining of all of the North American bird guilds. Intact, open landscapes are essential habitat components for the greater prairie-chicken and other grassland birds that are the umbrella species for this project. These open landscapes are also essential for the viability of ranching communities in the Flint Hills, and in turn provide habitat at the scale necessary for grassland interior specialists.

Establishing the Flint Hills Legacy Conservation Area would provide for the conservation of up to 1,100,000 acres of important tallgrass habitat on private land. This program would help maintain the intactness of the Flint Hills tallgrass prairie region and complement conservation efforts of Ranchland Trust of Kansas, Tallgrass Legacy Alliance, Kansas Land Trust, The Nature Conservancy, KDWP, and other federal and state agencies.

### **Other Fragmentation Issues**

Conservation easements within the Flint Hills Tallgrass Legacy Conservation Area would help reduce habitat fragmentation resulting from a lack of fire and encroachment by woody species. Key biological linkages that facilitate wildlife movement and provide for wildlife habitat requirements would be maintained. The conservation of large, unfragmented blocks of tallgrass prairie would allow the continued use of prescribed fire to maintain healthy habitat. In particular, patch or rotation burning provides the mosaic of habitat conditions required by grassland birds.

One of the greatest threats to the tallgrass region is forestation due to fire suppression. Fire also maintains overall prairie health and in turn promotes heterogeneity, a precursor to biodiversity. Maintaining fire in the Flint Hills would be maintained through objective, voluntary management in this alternative.

### ***Water and Soil Resources—Alternative A (No Action)***

The prospect of residential development in the Flint Hills area represents a potentially significant threat to the aquatic habitat. Sewage-derived nutrient additions to streams could have detrimental effects on the aquatic ecology (Wernick et al. 1998). Housing developments can also result in water diversion, and introduction of invasive species. Development could also change drainage patterns or rate of surface runoff, increasing soil erosion and nonpoint source pollution.

As demand for potable water increases for new subdivisions, water rights could be questioned and challenged to a greater extent in the future. Groundwater aquifers would receive more demand, resulting in potential degradation to the hydrology of some wetland areas.

Conversion of grasslands to cropland has been documented to increase sedimentation and pesticide runoff into wetlands. Tillage increases the sediment load into wetlands when compared to grasslands (Gleason and Euliss 1998, Kantrud et al. 1989), primarily due to wind erosion (Natural Resources Conservation Service 1992).

### **Carbon Sequestration Effects**

Although eastern red cedar forests may provide strong regional carbon sinks, these sinks are vulnerable to significant losses through volatilization in fire, as well as losses through soil erosion caused by reduced herbaceous cover in these forests.

### ***Water and Soil Resources—Alternative B (Proposed Action)***

Water resources on up to 1,100,000 acres would be protected from increased non-point source pollution from residential subdivision, commercial development, increased erosion, and draining of wetlands, all of which are prohibited under the proposed easement program.

Compatible agricultural practices such as livestock grazing or haying would continue, while sod busting would be prohibited. The landowner would continue to own and control water rights.

### **Carbon Sequestration Effects**

Carbon sequestration is cited as a goal of the USFWS Action Plan for Climate Change (USFWS 2009). Tallgrass prairie is well known for its ability to store carbon within soils. In addition, research at Konza Prairie identifies tallgrass prairie as a carbon sink under elevated CO<sub>2</sub> concentrations (Williams et al. 2004). Therefore, conservation of the Flint Hills grasslands would not only ensure the storage of existing soil CO<sub>2</sub>, but also provide a place for future sequestration if atmospheric CO<sub>2</sub> concentrations increase. Some studies have indicated under conditions of elevated levels of CO<sub>2</sub> carbon is stored in greater proportions belowground and productivity increases in plant systems like the tallgrass prairie found in the Flint Hills (Canadell et al. 1996, Williams et al. 2004). Grasslands store the majority of carbon within the soil, whereas forests hold the greatest abundance of carbon in aboveground biomass. While projects that sequester carbon through reforestation receive much attention, equal attention should be focused on retaining carbon that is currently stored in soils.

## **EFFECTS ON THE SOCIOECONOMIC ENVIRONMENT**

This section describes the estimated effects of alternatives A and B on landownership, land use, public use, development (including oil and gas, wind energy, and residential), and intact ecosystems values.

### ***Landownership and Land Use—Alternative A (No Action)***

More than 90 percent of the Flint Hills prairie would remain in private ownership. Ranching opportunities could be reduced when landowners begin to split tracts into smaller lots for residential and commercial development. However, landowners that subdivide could increase their revenue by developing recreational home sites. With subdivision, tracts could potentially increase in value if there is desire to cluster housing or to keep open space for future housing developments.

The community would lose open space and the aesthetics of the tallgrass prairie, and the stunning scenic vistas would be diminished.

### ***Landownership and Land Use—Alternative B (Proposed Action)***

The easement program would maintain the aesthetics of the tallgrass prairie while providing protection of trust resources through conservation of wildlife habitat and protection of land from surface disturbance or development, and fragmentation.

In 2006, the Outdoor Industry Foundation reported that wildlife and bird watching contributed \$730 billion annually to the United States economy, with an estimated 66 million American participating in wildlife viewing (Southwick Associates 2007).

The proposed action would only affect lands on which the Service has acquired a conservation easement. The location, distribution, and sale of development rights by landowners on adjacent lands without Service easements would not be affected. Ongoing, traditional agricultural uses such as livestock grazing would allow ranching to continue on easements. This alternative would maintain open space on a large landscape scale, thereby preserving the rural lifestyle and associated tourism and economic activities of the area. The purchase of an easement would not result in a transfer of land title, and private landowners would continue to pay property taxes.

Positive effects may occur from increased public wildlife viewing, tourism, fishing, and hunting opportunities. Open space also may enhance property values on adjoining lands as people begin to seek out undeveloped lands in the future.

In addition, maintaining intact tallgrass prairie habitat would provide “ecosystem services” that are often unrecognized, or considered “free” (for example pollination, water purification, nutrient cycling, carbon sequestration, soil conservation, and control of pest insect populations by birds) that would not be

provided in areas that have undergone residential or commercial development.

The easement program would have no effect on tribal jurisdiction or tribal rights because it is outside of reservation lands and deals only with private landowners willing to sell an easement.

### ***Public Use—Alternative A (No Action)***

The Service would not purchase conservation easements, and landowners would manage public use.

### ***Public Use—Alternative B (Proposed Action)***

Conservation easements purchased on private tracts would not change the landowner's right to manage public access to their property.

Under the proposed easement program private landowners would retain full control over their property rights, including allowing or restricting hunting and fishing on their lands.

### ***Development—Alternative A (No Action)***

The incremental increases in infrastructure construction resulting from commercial (oil and gas, wind) and residential development in the Flint Hills will likely result in the fragmentation of habitat currently used by grassland-dependent wildlife. Over the long-term, the combined effect of these activities will likely result in the continuation, and possibly the acceleration, of the decline of grassland bird populations.

Over time, subdivision and development would reduce agri-tourism, hunting, and wildlife observation opportunities, resulting in diminished economic benefits associated with these activities to local communities.

Those landowners and the surrounding communities would lose open space, and the aesthetics of the wide open vistas in the conservation area would diminish with the anticipated increase in development. Development could reduce tourism, hunting, and wildlife observation opportunities, and diminish revenue associated with these activities to local communities.

### **Oil and Gas Exploration and Development**

Oil and gas development would continue to occur on private lands in the Flint Hills. Stipulations to protect the surface estate would be governed by existing state regulations.

### **Wind Energy Development**

The Flint Hills Conservation Area project would remain in private ownership, having no additional

Service restrictions. Landowners could potentially profit by allowing wind energy development infrastructure to be developed on their land.

### **Residential Development**

During the 1960s, demographers documented that, for the first time in American history, higher proportions of people were leaving cities for rural areas than were making the return trip (Fuguitt 1985). Residential development and subdivision tend to fragment wildlife habitat, and generally increase the costs to county governments that have to provide services to rural subdivisions.

### ***Development—Alternative B (Proposed Action)***

The proposed alternative will protect up to 1.1 million acres of tallgrass prairie from the combined effects of various future development activities by precluding surface occupancy, and the resultant infrastructure from fragmenting tallgrass habitat. The Service's proposed FHLCA is the only presently known action of similar scope and scale that is seeking landscape-scale conservation of the tallgrass prairie in the Flint Hills.

Ongoing, traditional agricultural uses such as livestock grazing would allow ranching to continue. This alternative would maintain open space on a large landscape scale, thereby preserving the rural lifestyle of the area.

### **Oil and Gas Exploration and Development**

The proposed easement program would preclude oil and gas exploration or development requiring surface occupancy on easement land. Typically, conservation easements do not affect subsurface estates (oil and gas deposits) because the Service only acquires rights associated with surface ownership. In many places where the subsurface estate has been severed from surface ownership, including along the Flint Hills, the landowner does not own the subsurface rights; and this means that the easement that the Service acquires from the landowner is junior to the subsurface rights.

For easements that have been put in place on land where the owner has not sold or leased the mineral or subsurface estates (oil and gas deposits), the U.S. Fish and Wildlife Service easement would be senior to any subsurface interests later acquired by a developer. Since development of the mineral estate could significantly impact the resources the Service is attempting to protect, the Service would require a developer to access minerals from off-site. Surface occupancy of the easement for mineral development would be prohibited.

## Wind Energy Development

The easement program would enhance the protection of tallgrass prairie-dependent wildlife species through conservation of wildlife habitat and protection from surface disturbance or development of wind energy infrastructure, while providing some financial compensation to landowners through the sale of easements, to offset some of the potential revenue loss from the sale of wind energy development leases.

The project will only affect lands on which the Service has acquired a conservation easement. Location and distribution on adjacent lands without Service conservation easements will not be affected. Over 89% of Kansas has the potential for the development of wind energy (National Renewable Energy Lab 2010) most of which (over 45 million acres) would still be available for development under the proposed alternative.

## Residential Development

Preventing subdivision and development could decrease future tax revenues in a defined market area. However, open space could actually provide a net savings to local governments when compared to the revenues generated and costs of services associated with residential development (Haggerty 1996).

### ***Value of Intact Ecosystems—Alternative A (No Action)***

Under the no action alternative, the threat of grassland fragmentation will continue unabated. Landowners may continue to face economic pressures to subdivide their ranches. Tree encroachment and urban fragmentation will compress the Flint Hills region, leaving fewer larger parcels of tallgrass prairie.

### ***Value of Intact Ecosystems—Alternative B (Proposed Action)***

Under the proposed action, the Flint Hills grasslands would remain intact, continuing to provide ecosystem goods and services to landowners and local communities. Ecosystem services include: soil erosion control, water supply, hay production, biodiversity, and carbon sequestration. Researchers have attached dollar values to the ecosystem services provided by the grasslands of the Great Plains (Dodds et al. 2008). Overall, the native grasslands of the Great Plains produce \$1,189 billion per year of ecosystem goods and services. Compared to other habitat types in the United States (eastern forests, deserts, wetlands), Great Plains grasslands have substantial value because of their significant acreage and their high quality (Dodds et al. 2008).

Great Plains grasslands stand out in other ways as well. Compared to other terrestrial ecosystems, grasslands provide the highest commodity value because of hay production. In addition, they show high economic value for biodiversity, due to the abundance of insect pollinators (Dodds et al. 2008). Beneficial insects from grasslands can provide pollination services to surrounding agricultural crops.

More locally, Kansas State Research and Extension conducted a watershed protection strategy for the Neosho River headwaters, most of which originates in the Flint Hills. The models for erosion control make comparisons between urban, cropland, and grassland cover types. Intact grassland provides a 95% reduction in soil erosion when compared to other cover types (Kansas State University Research and Extension 2009). This ecosystem service retains soil productivity and improves water quality for surrounding communities.

The proposed action would help protect valuable ecosystem services as shown in figure 4. Furthermore, it would prevent the prohibitively high cost of restoration.

## UNAVOIDABLE ADVERSE IMPACTS

Any adverse effects that may be unavoidable while carrying out alternatives A and B are described below.

### ***Alternative A (No Action)***

The adverse impacts of degradation and habitat fragmentation would be expected to be more widespread and prevalent in the project area.

### ***Alternative B (Proposed Action)***

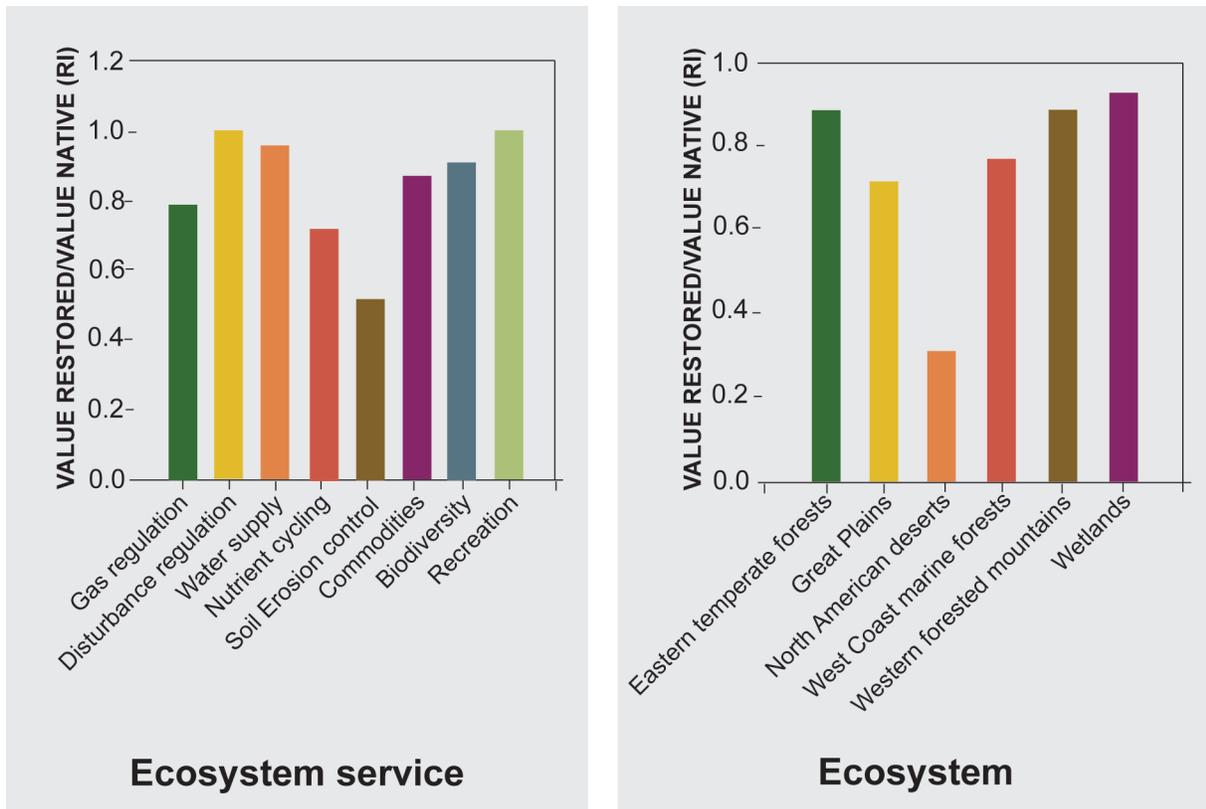
No direct or indirect unavoidable adverse impacts to the environment would result from the selection of alternative B. The easement program would not result in unavoidable adverse impacts on the physical or biological environment. The selection of an approved boundary would not, by itself, affect any aspect of landownership or values.

## IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Any commitments of resources that may be irreversible or irretrievable as a result of carrying out alternatives A and B are described as follows.

### ***Alternative A (No Action)***

There would be no additional commitment of resources by the Service if no action is taken.

**Figure 4. Relative native and restored benefits of ecosystem goods and services.**

The relative value (RI) is determined as the ratio of estimated benefits derived from native and restored acreages per year. (Source: Dodds et al. 2008.)

The likely introduction of new residential and commercial infrastructure to the Flint Hills tallgrass prairie would be an irretrievable loss of habitat for as long as the structures are in place. The irretrievable loss of habitat caused by the development of new residential and commercial infrastructure in the Flint Hills could eventually lead to an irreversible loss of both species and habitat.

The new infrastructure could effectively cause an irretrievable loss of habitat for tallgrass prairie bird species because of their avoidance of tall structures. With the loss of habitat some of these bird species could be pushed towards threatened or endangered status. Without other suitable habitat being available, there could be an irreversible loss of some bird species.

With new residential and commercial infrastructure development in the Flint Hills prescribed fire activity to maintain tallgrass prairie habitat could be further reduced. Without prescribed fire, tree encroachment would continue to reduce the tallgrass prairie habitat for the greater prairie-chicken and other grassland bird species, possibly leading to an irreversible loss of habitat.

### **Alternative B (Proposed Action)**

There would not be any irreversible or irretrievable commitments of resources associated with establishing the conservation easement program. Once easements are acquired, irreversible and irretrievable commitments of funds to protect these lands (such as expenditure for fuel and staff for monitoring) would exist.

The introduction of new residential and commercial infrastructure to the Flint Hills tallgrass prairie would be greatly restricted on conservation easement lands, reducing the likelihood of an irretrievable loss of habitat associated with development. The irretrievable loss of habitat caused by the development of new residential and commercial infrastructure in the Flint Hills that would eventually lead to an irreversible loss of both species, and habitat could be minimized under the proposed action.

With the restrictions on residential and commercial infrastructure development on conservation easement lands, prescribed fire could be more easily utilized to maintain tallgrass prairie. Prescribed

fire is necessary to limit tree encroachment and to maintain tallgrass prairie habitat for the greater prairie-chicken and other grassland bird species, and to prevent an irreversible loss of habitat.

## SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

This section describes the short-term effects versus long-term production from the expected actions in alternatives A and B.

### *Alternative A (No Action)*

Ranches may be sold to developers for short-term gains, which would have a negative impact on the long-term biological productivity of the area.

Over the long-term, the costs to counties to sustain development in rural areas could be significant (see the “Landownership and Land Use” section on page 27). Wind energy development, and oil and gas development would provide short-term income gains, but would have a long-term adverse impact on the tallgrass ecosystem.

### *Alternative B (Proposed Action)*

The proposed conservation easement program would maintain the long term biological productivity of the Flint Hills prairie grassland and riparian ecosystems, increased protection of endangered and threatened species, and maintenance of biological diversity.

The nation would gain the protection of tallgrass prairie species for future generations of Americans. The public would gain long term opportunities for wildlife dependent recreational activities.



*Greater prairie-chicken.*

USFWS

## CUMULATIVE IMPACTS

Cumulative impacts are defined by NEPA policy as the impacts on the environment which result 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 (40 CFR § 1508.7)

This section describes the cumulative impacts on the environment that may result from the combination of reasonably foreseeable actions in alternatives A or B, together with other biological and socioeconomic conditions, events, and developments.

### *Past Actions*

Past land protection efforts within the Flint Hills ecoregion have included the establishment of the Tallgrass Prairie National Preserve in 1996 by the National Park Service; the U.S. Department of Agriculture Grassland Reserve Program which currently holds approximately 17,000 acres of easements; an informal moratorium on wind development by a past governor; and the acquisition of approximately 35,000 acres of conservation easements by nonprofit organizations. The PFW program has worked with private landowners to restore or enhance 349,342 acres of tallgrass prairie to date.

### *Present Actions*

The Service’s proposed action to establish an approximately (but not to exceed) 1.1 million acre conservation easement program is the only known present action of similar scope and scale for land protection in the Kansas portion of the Flint Hills ecoregion. Once approved, it will take a number of years for the program to begin to have a noticeable effect. Securing initial funding and completing real estate transactions will take time.

### *Reasonably Foreseeable Future Actions*

Reasonably foreseeable actions are actions and activities that are independent of the conservation area proposed action but could result in cumulative or additive effects when combined with the proposed alternatives. They are anticipated to occur regardless of which alternative is selected. Energy (oil and gas, and wind) and residential development, and future prairie conservation efforts by a variety of organizations are the primary, reasonably foreseeable actions occurring in the Flint Hills region.

## Oil and Gas Development

Kansas ranks among the top 10 crude oil producing states with production occurring throughout the state. In addition, Kansas also produces a substantial quantity of natural gas, and its infrastructure is a transportation hub for supplies moving throughout the country. (U.S. Energy Information Administration 2010)

## Wind Energy Development

Over 89% of Kansas has been determined by National Renewable Energy Lab (NREL) to show potential for development of wind energy (National Renewable Energy Laboratory 2010). Second only to Nebraska, Kansas has extremely high wind energy potential with 47.1 million acres (190,474 km<sup>2</sup>) available with the installed capacity of 952,371 megawatts and an annual generation of 3.7 million gigawatt-hours. The FHLCA proposed the creation of a program to acquire conservation easements on up to 1.1 million acres, which represents 0.21% of the national or 2.34% of Kansas' total wind potential.

Current estimates of windy land area and wind energy potential developed by the NREL state that approximately 517 million acres (2.092 million km<sup>2</sup>) of land within the 48 contiguous states of the United States have an installed capacity of 10.5 million megawatts and an annual generation of 36.9 million gigawatt-hours.

## Residential Development

Total land in farms in Kansas from 1969 to 2007 declined from about 49.4 million acres to about 46.3 million acres, a decrease of more than 6 percent, while the urban population in the state increased from 1.29 million people to 1.8 million people between 1980–2009 (USDA 2010). As urban areas spread into the surrounding prairie areas, the tallgrass habitat becomes increasingly fragmented by trees and buildings and roads.

## Other Conservation Efforts

Ongoing efforts by a variety of organizations and agencies including TNC, RTK, TLA, Natural Resources Conservation Service (NRCS), and PFW have led to the successful conservation of approximately 35,000 acres of tallgrass prairie, and the enhancement and restoration of another 349,342 acres. Based on potential success of the proposed action in achieving land protection, it is anticipated that the Service will also consider protecting lands in Oklahoma within the Flint Hills (Osage Plains) ecoregion. The Kansas Legislature may continue to consider a large-scale moratorium on wind development within the Flint Hills. Currently, there is not a solid base for analysis, and it would therefore be speculative to try to determine any effects in relation to the proposed action. The Service

does not plan additional land protection in eastern Kansas beyond existing programs at the Marais des Cygnes NWR and a smaller set of options being explored to preserve some lands along the Missouri River. Lastly, we expect nonprofit organizations to continue to be active in the Flint Hills ecoregion, but based on past experience, it is anticipated that their role will shift in part from easement acquisition to a partnership in achieving the Service's goal of protecting up to 1.1 million acres.

## DEVELOPMENT—ALTERNATIVE A (NO ACTION)

The incremental increases in infrastructure construction resulting from development activities (oil and gas, wind and residential) in the Flint Hills will likely result in the fragmentation of habitat currently utilized by grassland-dependent wildlife. Over the long-term, the combined effect of these activities will likely result in the continuation, and possibly the acceleration, of the decline of grassland bird populations.

## DEVELOPMENT—ALTERNATIVE B (PROPOSED ACTION)

The proposed alternative will protect up to 1.1 million acres of tallgrass prairie from the combined effects of various future development activities by precluding surface occupancy, and the resultant infrastructure from fragmenting tallgrass habitat. The Service's proposed FHLCA is the only presently known action of similar scope and scale that is seeking landscape-scale conservation of the tallgrass prairie in the Flint Hills.

## CONSERVATION EFFORTS— ALTERNATIVE A (NO ACTION)

Current Service programs such as Partners for Fish and Wildlife would continue within the conservation project area. The Service would continue to work cooperatively with landowners to voluntarily improve habitat on private land.

## CONSERVATION EFFORTS— ALTERNATIVE B (PROPOSED ACTION)

Through the proposed easement program, up to 1,100,000 acres of privately owned native tallgrass prairie habitats would be added to the 31,000 acres within the project area that already have some level of protection. This would have long term positive impacts on wildlife habitat and result in the long term conservation of migratory birds, threatened and endangered species, native plants, and the overall biological diversity of the Flint Hills tallgrass prairie.

