



United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240



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PEP/NRM

ER10-356

Elizabeth Orlando
Keystone XL Project Manager
U.S. Department of State
OES/ENV, Room 2657
Washington, D.C. 20520

Dear Ms. Orlando:

The Department of the Interior (Department) has reviewed the Department of State's (DOS) Draft Environmental Impact Statement (DEIS) for Keystone XL Oil Pipeline (Keystone) Project and Application for a Presidential Permit for the Proposed Construction, Connection, Operation, and Maintenance of a Pipeline and Associated Facilities at United States Border for Importation of Crude Oil from Canada. The proposed project consists of construction and operation of a proposed oil pipeline from Hardisty, Alberta, Canada, to the Port Arthur and east Houston areas of Texas. Within the United States, the proposed project consists of approximately 1,380 miles of new 36-inch pipeline in the States of Montana, South Dakota, Nebraska, Oklahoma, and Texas, and facilities to interconnect with an existing pipeline in Kansas. The Department provides the following comments.

AUTHORITY

These comments are submitted by the Department pursuant to authorities under the Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq. (FWCA)), Endangered Species Act of 1973, as amended (16 U.S.C. §§1531 to 1543 et seq. (ESA)), National Environmental Policy Act (42 U.S.C. §4321 et seq.), Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §703 et seq. (MBTA)), the Bald and Golden Eagle Protection Act (BGEPA), as amended (16 U.S.C. §668 et seq.). The views of the Department's Fish and Wildlife Service (FWS) with respect to mitigation measures to avoid, minimize, and offset adverse project impacts are guided, in part, by the FWS Mitigation Policy (see 46 FR 7644 of Jan. 23, 1981).

GENERAL COMMENTS

Migratory Birds

The DEIS (p. 5-13) states that a Migratory Bird Mitigation Plan will be developed in consultation with the FWS to avoid, minimize, and mitigate impacts to migratory birds and migratory bird habitats.

The Migratory Bird Mitigation Plan with specific mitigation measures should be developed before the Keystone project construction activities are initiated. The FWS Migratory Bird Regional Offices and Field Offices will be able to recommend regional- and area specific mitigation needs and conservation opportunities. Please contact the following offices to participate in the Migratory Bird Mitigation Plan:

FWS Ecological Services Field Offices

Arlington, Texas;

Tulsa, Oklahoma;

Clear Lake Ecological Services Field Offices

Grand Island, Nebraska

Pierre, South Dakota

Billings, Montana

FWS Migratory Bird Offices

Lakewood, Colorado

Albuquerque, New Mexico

The Migratory Bird Treaty Act (MBTA) has no provision to allow unauthorized take of migratory birds. The FWS recognizes, however, that some birds could be killed during construction and operation of energy infrastructure even if all known reasonable and effective measures to protect birds are used. The FWS's Office of Law Enforcement (OLE) carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to avoid take of migratory birds and by encouraging others to implement measures to avoid take. It would not be possible to absolve individuals, companies, or agencies from liability even if they implement bird mortality avoidance or other similar protective measures. However, the OLE focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without identifying and implementing all reasonable, prudent and effective measures to avoid take. We encourage companies to work closely with the FWS biologists to identify available protective measures when developing project plans and/or avian protection plans, and to implement those measures prior to and during construction, and similar operational activities.

The FWS recommends the following conservation actions for the Keystone project to avoid impacts to migratory birds:

1. Take of migratory birds should be avoided, and loss, destruction, and degradation of migratory bird habitat should be minimized.
2. Avoid any habitat alteration, removal, or destruction during the primary nesting season for migratory birds. If there is reasonable likelihood that any project activities will take

migratory birds, those activities should be performed during the time of year that the birds are not nesting. This includes vegetation clearing, cutting, and grubbing.

The primary nesting season for migratory birds varies greatly between species and geographic location. Principally, nesting seasons extend from early April to mid-July, but the maximum period for the migratory bird nesting season can extend from early February through late August. Eagles and some owls may initiate nesting in late December in some geographic areas. Due to this variability, Project proponents should consult with the appropriate the FWS's Regional Migratory Bird Program for specific nesting seasons of all protected species that may nest in the Project area. We recommend that Project proponents strive to complete all disruptive activities outside the migratory bird nesting season to the greatest extent possible. Vegetation clearing in the year prior to construction (but not within the nesting season) may help to discourage birds from attempting to nest in the proposed construction area, thereby decreasing the likelihood of take by construction activities.

3. If the proposed project will potentially take migratory birds and/or result in loss or degradation of migratory bird habitat, and work cannot occur outside the migratory bird nesting season (either the primary or maximum nesting season), project proponents should provide the FWS with an explanation for why the work must occur during the nesting season. Further, in these cases, project proponents also must demonstrate that all efforts were made to complete work outside the migratory bird nesting season and the reasons for work during the nesting season are beyond the proponent's control.

When project construction cannot occur outside the migratory bird nesting season, project proponents should survey those portions of the proposed project area during the nesting season prior to construction to determine if migratory birds are present and if nesting occurs in those areas. In addition to conducting surveys for nesting birds during the construction phase, project proponents may benefit from conducting surveys during the prior nesting season. Such surveys will assist the proponent in any decisions about the likely presence of nesting migratory birds or sensitive species in the proposed project or work area. Though individual migratory birds do not necessarily return to nest at the exact site as in previous years, a survey in the year before construction will familiarize the project proponent with the species and numbers present in the project construction area. Bird surveys should be completed during the nesting season in the best biological timeframe for detecting the presence of nesting migratory birds, using accepted bird survey protocols. The FWS's Migratory Bird offices or Ecological Services field offices can be contacted for recommendations on appropriate procedures.

Project proponents also should be aware that results of migratory bird surveys are subject to spatial and temporal variability. If construction during the primary nesting season cannot be avoided and will impact habitats suitable for nesting birds, the project proponents also should conduct migratory bird surveys during the actual year of construction.

4. If no migratory birds are found nesting in the proposed project areas immediately prior to project construction and associated activities, project activity may proceed as planned.

5. If migratory birds are present and nesting in the proposed project area, officials of the Keystone project should contact the nearest FWS's Ecological Services field office and the FWS's Regional Migratory Bird Program for guidance on appropriate next steps to take to minimize impacts to migratory birds associated with the project.

These proposed conservation actions assume that no federally endangered or threatened migratory bird species, or other listed animals or plants are present in that portion of the project area. If endangered or threatened species are present, or potentially present, and the project could affect these species, officials of the Keystone project should consult with the nearest FWS's Ecological Services field office before proceeding.

The FWS is concerned about impacts to migratory birds caused by the construction of above-ground facilities such as meter stations, pump stations, connection stations, main line valve stations, and other facilities associated with the project. The locations of all above-ground facilities associated with the pipeline should be identified and depicted on a map to aid resource agency evaluation. All utility lines associated with this project should be included in the project description, and the DEIS should evaluate the impacts of these structures to bird habitat.

The FWS recommends that any bright lighting associated with above-ground structures should be down-shielded to reduce disturbance to migratory birds. In addition, security lighting for on-ground facilities and equipment should be down-shielded to keep the light within the boundaries of the site to reduce impacts to resident bird and wildlife species.

Power transmission lines are often a hazard to migratory birds in flight. Therefore, we recommend alternatives, such as underground installation, be considered for transmission lines, especially in or near feeding, nesting, or roosting areas for waterbirds.

The FWS recommends that all project activities along the Gulf coast be prohibited within 1,000 feet of active bird rookeries during their primary nesting season, February 15 to September 1. TransCanada Keystone XL Pipeline should develop a survey and monitoring plan to locate rookeries and to ensure they are not disturbed by construction activities.

Bald and Golden Eagle Protection Act

Bald and golden eagles are protected under both the MBTA and the Bald and Golden Eagle Protection Act (BGEPA). The BGEPA prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. Activities that would disturb bald or golden eagles also are prohibited under BGEPA. "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best available scientific information: (1) injury to an eagle, (2) a decrease in the eagles' productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. If a proposed project or action would occur in areas where nesting, feeding, or roosting eagles occur, you may need to take additional conservation measures to achieve compliance with BGEPA. New regulations (50 CFR § 22.26 and § 22.27) allow for the take of bald and golden

eagles and their nests in certain circumstances. However, coordination with the Migratory Bird, Ecological Services, and OLE programs of the FWS will be required before a permit is issued.

Wetlands

The EIS should identify all wetlands existing within the temporary and permanent project right-of-ways (ROW) for both the proposed and alternative pipeline routes. For purposes of public disclosure of project impacts, maps depicting these wetlands should be developed to facilitate resource agency review and evaluation.

Wetlands crossed by roads should have culverts or similar structures installed to ensure hydrology is maintained. Where wetlands and other water body crossings cannot be avoided, we recommend directional drilling be used to avoid and minimize impacts. The wetlands and other water bodies proposed for avoidance by directional drilling should be identified in the EIS, with input from the Department FWS and other state and Federal resource agencies.

The impacts on wetlands from the project-related activities and auxiliary facilities such as project access roads, pipe storage yards, rail sidings, contractor's yards, and construction camps should be included in the EIS. Temporary loss of wetland function and values also should be addressed in the EIS. The temporary loss of wetland functions and values during, and immediately following, construction will be important in determining the total amount of wetlands affected by project activities and the mitigation necessary to offset wetland impacts.

We recommend that a wetland mitigation plan be developed in consultation with state wildlife agencies and the FWS, with a goal of "no net loss" of in-kind wetlands. We recommend the DEIS address impacts to *all* wetland types, and that the wetland mitigation plan mitigate these impacts. Wetland mitigation planning should occur with input and review by the FWS and other Federal and state resource agencies, and mitigation of impacts should be determined by the Army Corps of Engineers (Corps) with input from the FWS, state, and other Federal resource agencies. A preliminary estimate of the proposed compensation and mitigation also should be disclosed within the EIS for public review and comment.

Animal Passage and Aquatic Biota

The DEIS identifies several aquatic species potentially impacted by the proposed project activities, but the discussion of proposed mitigation activities to minimize, reduce, or prevent impacts on these species, especially for the Fisheries section of the DEIS is minimal. It would be a benefit to the public for the final EIS to include relevant scientific literature that discuss impacts associated with similar pipeline projects, assessments based on those findings, and proposed mitigation options to avoid, minimize, or reduce impacts on those species.

Installed culverts, either as permanent or temporary crossings, should be constructed at elevations that do not impede movements of fish, amphibians, and other aquatic and semi-aquatic animals. FWS further recommends that the project proponent not alter or install culverts in any way that would reduce the present channel width. We have attached recommended best management practices for stream and rivers to minimize potential impacts to mussels, native fish and other aquatic resources (Attachment 2).

Nuisance and Invasive Species Monitoring and Control Plan

A plan to monitor and control nuisance and invasive species should be developed and implemented throughout the life of pipeline project operations. This particularly applies to the vegetation and aquatic species. To reduce the distribution of invasive species, we recommend that all equipment be cleaned and/or treated before entering areas with sensitive habitats.

Areas of Conservation Concern

Pineywoods Mitigation Bank – The DEIS indicates the proposed pipeline will cross the Pineywoods Mitigation Bank (Bank). In order to minimize impacts to this sensitive area and reduce forest fragmentation in the Bank, we recommend moving the proposed pipeline to the existing pipeline corridor located to the east of this area. Additional information regarding the Bank can be obtained from the Corps' Galveston District bank representative, Mr. Sam Watson, at (409) 766-3946.

Trinity River National Wildlife Refuge – Pipeline alignment in relation to the boundaries of the FWS wildlife refuges should be clarified. Although the DEIS states that the pipeline crosses no Federal lands in Texas and Oklahoma, the small-scale maps in the DEIS make it difficult for reviewers to verify the proposed alignment in relation to refuge lands. Based on the maps provided, it appears the pipeline may cross Trinity River National Wildlife Refuge (NWR), located south of Liberty, Texas. We recommend that you contact the Trinity River NWR regarding the alignment and to identify any potential direct or indirect impacts that should be addressed.

In addition, the EIS should state that the pipeline alignment would cross two Priority One Bottomland Hardwood Forests in Texas. These two forested areas are the Demijohn Lake/Devers Canal (portions of which are now part of the Trinity River NWR) along the Trinity River south of Liberty, Texas, and the Middle Neches River. These sites were identified in the Texas Bottomland Hardwood Preservation Program Concept Plan (USFWS 1985).

Deep Fork Wildlife Management Area – In several places, the DEIS misstates that the pipeline alignment would cross Deep Fork Wildlife Management Area (WMA) in Texas. This should be corrected to indicate Deep Fork WMA is located in Oklahoma.

Milk River Wildlife Management Area – A new power line to support a pipeline pump station is proposed to be located next to a large wetland at Montana's Milk River WMA (Area 8). The power line would run along the eastern boundary of the WMA and directly in the flight path of birds that use a large WMA wetland. The new power line would represent a new threat to birds using the WMA, as large numbers of waterbirds approach the wetlands from this direction.

The FWS recommends that a 0.5-mile length of the power line bordering Area 8 (South ½ Section 20, R33/T32) be buried to avert bird collisions. Burial would be a more permanent and effective solution to migratory bird mortality than power line marking. Though line marking would diminish the impacts, the new marked line would nonetheless be a new and added source of migratory bird mortality and would require continued maintenance costs.

Threatened and Endangered Species

Please refer to the FWS letter to DOS pertaining to the project's draft Biological Assessment (DBA) for detailed comments and recommendations regarding threatened and endangered species.

The FWS has indicated that the preferred Keystone XL pipeline route may affect and is likely to adversely affect the whooping crane, least tern, piping plover, American burying beetle (ABB), and western prairie fringed orchid (WPFO). The FWS's conclusion is based in part on the inclusion of the new distribution lines that will be built to deliver power to the pipeline pumping stations. Under ESA consultation procedures, these new power lines are part of the proposed project because, "but for" the construction of the proposed pipeline, the new power lines would not be necessary. Although the power lines are installed and operated by local power providers, the effects of the new power lines on listed threatened and endangered species will need to be evaluated in the consultation for the Keystone XL pipeline, along with the direct effects of the pipeline and any associated other ancillary facilities such as roads and pump stations.

Another factor in the FWS's recommendation to conduct formal consultation for the above species is the need for species surveys to detect presence immediately prior and during construction activities. Species surveys scheduled to occur as much as 2 weeks prior to construction activities would be inadequate to avoid adverse impacts to whooping cranes, least terns, and piping plovers that might be present in the area. (Thus, to minimize the potential impacts, the conservation measures described in the DEIS to avoid disturbance of these avian species should be revised.)

The threatened and endangered species list presented in DEIS Section 3.8 should be updated. In November 2009, Texas Parks and Wildlife Department listed six species of mussels within the project area as threatened: Louisiana pig toe (*Pleurobema ridellii*), sandbank pocketbook (*Lamsilis satura*), southern hickorynut (*Obvaria jacksoniana*), Texas heelsplitter (*Potamilus amphichaenus*) Texas pigtoe (*Fusconala askewi*), and the triangle pigtoe (*Fusconala lananensis*). In response to two petitions, the FWS is currently reviewing the status of the triangle pigtoe, southern hickorynut, Louisiana pigtoe, and the Texas heelsplitter to determine whether listing these species under the ESA may be warranted.

Candidate Species

The FWS recommends that the EIS assess potential project impacts on Neches River rose mallow and Louisiana pine snake. The habitats in the pipeline alignment in counties where these species occur should be evaluated to determine their suitability for these species.

Vegetation Communities

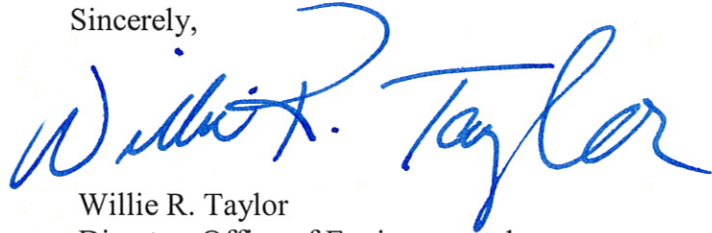
The DEIS discussion of the Cross Timbers vegetation type in Oklahoma does not mention significant blocks of old-growth habitat that occur within this area. The old-growth habitats areas should be mapped and should be avoided by the pipeline ROW. Dr. David Stahle, Professor of Geosciences at the University of Arkansas, has identified many ancient Cross Timber woodlands.

“Steep slopes” is used throughout the DEIS including the CMR Plan; however, there is no specific definition for steep slopes. A definition is needed to make an evaluation of mitigation measures as applied to “special construction procedures, erosion/sediment control measures, and reclamation/revegetation” discussed in Chapter 2 and the CMR Plan. Also, this would tell the reviewer where to expect to see these mitigation measures applied. Steeps slopes are defined in the USDA’s Soil Survey Manual (USDA 1993) as 20 to 60 percent. The USDI-BLM HiLine District uses this definition.

The Department has a continuing interest in working with the U.S. Department of State (DOS) and the Keystone project proponent to address the impacts to resources of concern to the Department. We look forward to working closely with DOS and other cooperating agencies to address our comments as this project moves forward.

Should you have any questions or wish to discuss these comments further, please do not hesitate to contact Dr. Vijai Rai of my staff at (202) 208-6661, or Vijai_Rai@ios.doi.gov.

Sincerely,



Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

Enclosure

ATTACHMENT 1

SPECIFIC COMMENTS

Pages 2-2 to 2-26, Section 2.1.1: Steel City Segment, Above Ground Facilities and Construction Procedures.

Comment: The total area either temporarily or permanently disturbed by the project, and that is located in potential ABB habitat, should be documented. This area should include all areas affected by construction activities, borrow sites, temporary and permanent above-ground facilities, pipe storage sites, contractor yards, railroad siding, pump stations, utility distribution line ROWs, and access roads. This information will be needed for formal consultation regarding the ABB. Similarly, information on the total project-disturbed area located in potential WPFO habitats will be needed for formal consultation on that species.

Page 2-22, Section 2.3.2.3: “Where grading occurs ~~and there is a need to separate topsoil from subsoil~~, topsoil would be removed ...from the subsoil.”

Page 2-24, Section 2.3.2.6: “Hydrostatic test water...discharged to a suitable upland area within the same water basin as the source waterbody.” The EIS should indicate what order is the watershed.

Page 2-25, Section 2.3.2.9: “Reclamation on the ROW would be inspected after the first growing season to determine the success of revegetation and noxious weed control. Erosion would be repaired and areas that were unsuccessfully re-established would be revegetated by Keystone or by compensation of the landowner to reseed as necessary.” Will erosion be repaired before the area is re-seeded?

Section 2.3.3.3: What is “steep terrain”?

Page 2-30: No section addressing ephemeral drainages

Section 2.5: Bureau of Land Management (BLM) has received two applications for ROWs for Transmission power lines to service PS-09 and PS-10A-1. We should incorporate the specific data into this section to clarify what has been previously provided and noted in the DEIS. Can we insert the legal descriptions specific to BLM land crossed somewhere (either in text, table or figure)?

Page 2-50, Section 2.5.1.1: 2nd paragraph, 4th line.... “structure consists of single pole” change to read: single and/or H framed wood poles. 2nd paragraph, 4th line... After sentence

ending with "...post insulator design." Add sentence: "Poles are typical 60-80 foot and the span length varies from 250 – 400 feet, depending on topography."

Page 2-50, Table 2.5.1-1: Can we insert the length crossing BLM administered land? There are only two: the Big Flat Electric Cooperative serving PS-09 will cross 32 miles of BLM land; the NorVal Electric Cooperative serving PS-10A-1 will cross 4.8 miles of BLM land. Perhaps this can be done in the column Estimated Power line Lengths by adding a "/" and BLM miles --- for example with PS-09: 62.4 total miles /32 miles BLM.

Page 2-54, Section 2.5.2.1: 2nd paragraph. Add sentence: "The proposed power lines would require a 100-foot construction width and an 80-foot permanent ROW width."

Page 3.1-13, Paleontology Portion of Section 3.1: The paleontology portion of Section 3.1 needs to incorporate the results of the paleontological inventories performed by SWCA on BLM lands for the Montana Segment of the Pipeline. If paleontological inventories for other sections of the pipeline have been completed, these also need to be included here.

Page 3.1-14, 2nd Paragraph: The Paleontological Monitoring and Mitigation Plan will also need to be included in the plan of development (POD) submitted to the BLM. It should also be stated here.

Page 3.1-14, 3rd Paragraph: The paragraph referring to the PA and 36 CFR 800 needs to be removed from this section. Fossils are not generally considered historic properties under NHPA. A separate document is needed to address unanticipated impacted to paleontological resources by the pipeline.

Page 3.1-21: "Implementation of temporary erosion control structures would reduce the likelihood of construction-triggered landslides." What type of structures would be used?

Page 3.2-1, Section 3.2.1: "Highly erodible soils" - How are these defined? Are these the same as the "Erosion Prone" listed in Appendix G, Table G-1? If so, state that here.

Page 3.2-5 and 3.2-6 Section 3.2.2.1: "Potential impacts could include...permanent soil contamination." Include soil mixing. "Construction activities would be shut down during the winter months...winter construction techniques." Page 2-19 states: "On the Steele City Segment, construction is planned to continue into the winter months for as long the weather permits." These say two different things. The word "heavy" needs to be removed from in front of construction vehicles and equipment." All vehicles are capable of causing soil compaction. There would be *Permanent* "loss of topsoil" unless there are provisions to segregate it.

Page 3.2-6, Section 3.2.2.1: "Construction activities would be shut down during the winter months on the Steele City Segment to prevent the need for winter construction techniques." This paragraph contradicts the language, "Continue into winter months for as long as weather permits." cited in the paragraph above.

Compaction section does not discuss "slower or less successful vegetation reestablishment following construction," which could lead to increased erosion.

Pages 3.2-11 and 3.2-12, Section 3.2.2.2, Soil temperature Impacts: The DEIS language at the top of page 3.2-12 states:

The study concluded that the pipeline does have some effect on the surrounding soil temperature; however, these effects occur primarily at the pipeline depth. Near-surface soil temperatures are influenced mainly by climate, with minimal effects from pipeline operations. Direct temperature effects on vegetation are expected to be minimal and vary seasonally.

Comment: This language is not entirely consistent with language regarding soil temperature impacts to vegetation on page 3.5-31:

Operation of the project would cause increases in soil temperatures at the soil surface (from 4 to 8°F) primarily during winter, and at depths of 6 inches (from 10 to 15°F), with the most notable increases during spring in the northern portion of the pipeline (Keystone, 2009c) (see Appendix L). While many plants would not produce root systems that would penetrate much below 6 inches, the root systems of some plants, notably native prairie grasses, trees, and shrubs; often penetrate well below 6 inches. Soil temperatures closer to burial depth of 6 feet could be as much as 40° F warmer than the surrounding soil temperatures (Appendix L). In general, increased soil temperatures during early spring would cause early germination and emergence... in tall-grass prairie species (Appendix L). Increased soil temperature may lead to localized soil drying....

This apparent discrepancy should be corrected or clarified, and an explanation of the methodology and results should be provided in more detail.

The effect of pipeline operation on soil temperature and moisture is also an issue that should be addressed in formal consultation on project impacts on the ABB. We recommend that information from Appendix L that addresses the affect of soil temperature on crops and vegetation also be applied to potential impacts to various stages of the ABB's life cycle in Section 3.8.1.6.

Page ES-2, 1st Line: Last paragraph in ES.2.1: Add portions in red – The pipeline would require a 110-foot wide construction right-of-way (ROW), consisting of a 60-foot temporary easement/**temporary use permit** and a 50-foot permanent easement/**ROW plus the ground occupied by the pipeline and related facilities**.

Page ES-3, Section ES.2, Line 2: The necessary electrical power lines and associated **facilities upgrades** would be...[the following sentence should added] For the proposed action, pumping stations #9 and #10A-1 (see Table 2.5.1.1) would require approval for authorizing proposed electrical power lines crossing federal lands.

Page ES-3, Section ES2, Line 5: Although the permitting process **under the Federal Land Policy and Management Act of 1976** for the electrical facilities... are considered connected action under NEPA and ~~were~~ **are** evaluated...

Page ES-3, Section ES-2.2, Last sentence: What does this sentence pertain to? Which alternatives?

Page ES-12, ES.6.6: The DEIS discusses power distribution line specifications.

Comment: All new power line or pole configurations should have insulation or line separation that would prevent bird, raptor and eagle electrocution. All new power line construction must adhere to the Avian Power Line Interaction Committee (APLIC) standards, as outlined in the Department of State's DBA, with the following exception: we recommend a minimum of 9-foot cross arms on power poles rather than 6-foot. This is because of cases documented by the FWS OLE where 6-foot span on cross arms were insufficient to protect large raptors (i.e., bald eagles and golden eagles) under wet conditions.

Page ES-17, Section ES.6.12, Air Quality and Noise: Pipeline construction activities in any one area could last from 30 days to 7 weeks. Construction of all pump stations would take approximately 18 to 24 months, and construction of the Steele City tank farm would take approximately 15 to 18 months.

Comment: Conservation measures to reduce potential impacts of noise from blasting and from operation of the pump stations should include measures to minimize harassment of migrating whooping cranes, nesting least terns, and piping plovers. If whooping cranes are present, construction activities should cease until the species' presence is reported to the nearest Ecological Services Field Office. The Field Office will then advise Keystone officials of measures to take before activities may resume.

Page 3.3-21, Table 3.3.1.3-1: NRCS soil data should be incorporated.

Page 3.3-24, Section 3.3.2.1: What is the expected timeframe of construction impacts of increased surface water runoff and erosion and degradation of groundwater quality? What about changes in infiltration by vegetation removal, soil compaction?

Page 3.3-25, Section 3.3.2.2: What is the expected timeframe of construction impacts of changes in channel morphology and stability? What would be the increases in total dissolved solids (TDS), nutrients, metals, and total organic carbon? Would there be decreased streambed porosity? What effects would occur from removal of riparian vegetation and channel incision?

Page 3.3-27, Section 3.3.2.2: "Geomorphic assessment of waterbody crossings could provide significant cost savings and environmental benefits." Will this be done? If so, where? What is the difference in impacts among the crossing methods? There should be a discussion of the impacts from each crossing method. Hydrostatic Testing section does not disclose any effects from withdrawal or discharge.

Section 3.3: There is a general inconsistency throughout the document as to whether the crossing depth is maintained for least 15 feet beyond the designated lateral migration zone or 15 feet to either side of the edge of the waterbody or at least 15 feet beyond either side of the active stream channel.

Page 3.3-28, Section 3.3.2.2: “Blasting has the potential to affect surface water resources.” What would be the effects? “Channel migration or streambed degradation could potentially expose the pipeline, resulting in temporary short-term or long-term adverse impacts to water resources.” What would be the effects? “Potential bank protection measures could include installing rock, wood, or other materials keyed into the bank to protect from further erosion, or provide protection for banks to reduce the bank slope. Disturbance associated with these maintenance activities may potentially create additional water quality impacts.” What would be these impacts? The use of these measures has impacts as well. “Bank erosion rates could exceed several meters per year. Not maintaining an adequate burial depth for pipelines in a zone that extends at least 15 feet (5 meters) beyond either side of the active stream channel could necessitate bank protection measures that would increase both maintenance costs and environmental impacts.” Crossings need to be “for least 15 feet beyond the *designated lateral migration zone*” or evaluated site-specifically. “In addition to the measures that Keystone has committed to use to protect water resources during operation, the following potential mitigation measures have been suggested by regulatory agencies:” Does this mean that these measures will be employed? If not, the document should explain why not.

Page 3.3-29, Section 3.3.2.3: “Although two pump stations and 10 MLVs would be in the 100-year floodplain as currently proposed, the effect of those facilities on floodplain function would be minor.” What would be the effects?

Page 3.4-4, paragraph 1: The summary of disturbed acres does not appear to include the acres of disturbance associated with pipe storage yards, rail sidings, contractor’s yards, access roads, or construction camps and similar project-impacted areas. We recommend these disturbed acres be included.

Page 3.4-7, Section 3.4.2: The document, Keystone 2009c, states that it, “...does not include acres of disturbance associated with pipe storage yards, rail sidings, and contractor’s yards for 1,261 acres in Oklahoma and Texas. Does not include acres of disturbance associated with access roads or construction camps”. Why are these acres not included in the analysis?

Page 3.4-9 The DEIS states that, "Construction of the pipeline would affect wetlands and their functions primarily during and immediately following construction activities, but permanent changes also are possible." The final EIS should include a reference for this statement of fact.

Page 3.4-9: The DIES states that, "...wetland vegetation community eventually would transition back into a community functionally similar to that of the wetland prior to construction, if pre-construction conditions such as elevation, grade, and soil structure are successfully restored." The final EIS should include a reference for this statement.

Page 3.4-9: The DEIS states that, "In emergent wetlands, the herbaceous vegetation would regenerate quickly (typically within 3 to 5 years)." The final EIS should include a reference for this statement.

Page 3.4-9: The DIES states that "Following restoration and revegetation, there would be little permanent effects on emergent wetland vegetation because these areas naturally consist of, and

would remain as, an herbaceous community." The final EIS should include a reference for this statement.

Pages 3.4-10 to 3.4-12: The DEIS proposes to mitigate construction and operation activities in wetlands. Suggest that the final EIS include scientific studies that describe the methods used and success rates of wetland restorations from other pipeline construction projects. It would also be beneficial to the public for the final EIS to discuss any potential long-term impacts, such as leaks or catastrophic failures of the pipeline, and propose a plan to mitigate such potential impacts. The public should benefit from understanding that the effectiveness of wetland restoration is not well understood, and that procedures for restoration of wetlands have been primarily developed through trial and error (USGS, 2006). The final EIS should discuss available studies on this subject. (See USGS (2004) wetland restoration database).

The DEIS makes reference to several surveys, but does not include citations. It would be a benefit to the public for the final EIS to include available supporting scientific references. In addition, the DEIS indicates that surveys will be conducted in the future. The final EIS should identify who is scheduled to conduct these surveys and the timeframe for conducting them.

Page 3.4-12, paragraph 10 - Wetland Mitigation Plan: We recommend that a wetland mitigation plan be developed in consultation with state wildlife agencies and the FWS, with a goal of "no net loss" of in-kind wetlands. (Please see our General Comments.)

Page 3.4-13, paragraphs 2 and 3: These paragraphs indicate power distribution lines associated with pumping substations could, in some areas, be constructed within and adjacent to wetland habitats. The DEIS states that impacts to wetlands would be avoided/minimized and unavoidable impacts to jurisdictional wetlands will be mitigated during the section 404 permitting process.

Because migratory birds and waterfowl are typically attracted to wetlands and riparian areas, the FWS is concerned with the documented problem of bird mortality from power lines collisions would not *necessarily* be offset by wetland mitigation. Avian collisions could be significant depending on the species involved and the particular placement of the power lines. For these reasons, we recommend that perch inhibitors and visual markers be installed on power lines near wetlands and at other locations in the ROW where collisions are likely to be significant. In addition, we recommend that power line burial be evaluated, case-by-case, when located in or adjacent to wetlands with significant bird use.

Pages 3.5-27 to 3.5-44, Section 3.5.5: Potential Impacts and Mitigation.

Comment: In addition to the summary tables of acres of vegetation communities, we recommend that the acres be summarized according to the quality of vegetation community affected, and according to temporary and permanent impacts. This will enable the FWS to consider the quality of the various communities impacted, and in turn, appropriate mitigation measures (per USFWS's Mitigation Policy, 46 FR 7656).

Page 3.6-1, paragraph 1: The DEIS uses the term "protected terrestrial wildlife." This term should be clarified because most terrestrial wildlife species are protected under state or Federal wildlife laws and statutes.

Page 3.6-1, paragraph 3: Regarding the reference to, “game elk populations in Montana and South Dakota,” we request that the DEIS clarify what constitutes game elk populations.

Page 3.6-1, Section 3.6.1.2 and Table 3.6.1-1: Although the swift fox is a special status species, it could still be mentioned briefly here with the other canids and furbearers as the reader could be looking for it in this section.

Page 3.6-8, Table 3.6.1-1: The term “Game Birds” in the Table and elsewhere in section 3.6 where this same reference occurs should be replaced with “Upland Game Birds.”

Page 3.6-13, Waterfowl and Game Birds section: If greater prairie chickens occur within the project area, this should be included in the discussion and added to Table 3.6.1-1. In regard to paragraph 2, sentence 1: although upland game birds are not protected under MBTA, they are protected, and their harvest regulated, under state wildlife laws and regulations.

Page 3.6-14, paragraph 1: We recommend that a more complete description of MBTA prohibitions be included, as follows: “The MBTA protects migratory birds, and their nests, eggs, young, and parts from possession, sale, purchase, barter, transport, import, and export, and take. For purposes of the MBTA, “take” is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.” (50 CFR § 10.12). The MBTA applies to migratory birds identified in 50 CFR § 10.13 (defined hereafter as “migratory birds”).

Page 3.6-14, 3.6.2 Potential Impacts: The header is not accurate for this section. If this project goes to construction, then many of the impacts described in this section will not be “potential” but rather “actual” impacts. The header should be edited to reflect this.

Page 3.6-14, 3.6.2 Potential Impacts: A number of other factors could negatively impact wildlife from project construction. These factors should be included in this discussion. They include: fugitive dust, especially in regard to road construction and vehicular traffic; disrupted wildlife movements or use of movement corridors; wildlife displacement by the pipeline or associated power lines; increase in predation due to new predator travel lanes, and, in some areas, hunting perches on power lines; displacement of ground-nesting birds that avoid areas with tall structures; invasive plants; increase in risk of wildfire, especially in regard to power lines; increased off-road traffic on trails, including unauthorized trail and road use; spills of hazardous materials; disturbance from helicopters or airplanes during construction or post-construction inspections. Finally, this section does not address the full extent of disturbance to wildlife that would occur, not just in active construction areas but also within the proximity to the pipeline roads and power lines.

Page 3.6-14, paragraph 4: The DEIS indicates that 22,493 acres would be lost or altered through project construction, but does not account for the habitat types of 7,883 acres. We suggest a table be added that provides a breakdown of the total acres (22,493) expected to be impacted by major habitat type, and by permanent versus temporary impacts. Also with regard to the 22,493 acres, please clarify whether this includes all components of the proposed action. (i.e., Are footprints of all valve stations, communication sites, storage yards, construction worker

camps, roads, power lines, and substations included? Are footprints of all interrelated components of this project included?) We recommend that acres presented in the EIS include estimates of both the total project footprint and the total area impacted.

Page 3.6-14: The DEIS states that "Aerial stick nest surveys were conducted along the entire project ROW during spring 2008 and 2009 to identify large stick nest sites of raptors and herons in deciduous trees within from 0.25 to 1 mile from the project centerline (Keystone 2009b)." The reference is to a data request; the reference should be to the actual survey and electronic link, if available.

Page 3.6-14: The DEIS states that "Nesting habitats were not recorded during the Gulf Coast and Houston Lateral surveys (Keystone 2009b)." The reference is to a data request; the reference be to the actual survey and electronic link, if available.

Page 3.6-19, last paragraph: The statement that, "Total habitat loss due to pipeline construction would be small in the context of available habitat both because of the lineal nature of the project and because restoration would follow pipeline construction," might be true, however, the DEIS should present the facts necessary to support this statement. We recommend that it be revised and qualified accordingly.

Page 3.6-20, paragraph 1: The last sentence of this paragraph states that Keystone XL would consult with appropriate state wildlife management agencies. We recommend that this be clarified to indicate that consultation would occur with the FWS for post construction and maintenance activities that would impact migratory birds, and threatened and endangered species.

Page 3.6-20: The DEIS states that "Burrowing animals would be expected to return and re-colonize the ROW after construction, although compacted areas such as temporary workspaces may become less suitable habitat." The final EIS should include a reference for this statement.

Page 3.6-21, paragraph 4: The DEIS states that if suitable new nest trees are not available within their territories, new territories would be established. This may not occur if the other territories are already occupied. We recommend that this analysis be clarified accordingly.

Page 3.6-21, Section 3.6.2.4: The use of nest-dragging surveys to determine the presence or absence of grassland ground-nesting bird nests on BLM land in Phillips County needs to be in the discussion, just in case construction should occur during the nesting season of April 15 to July 15.

Page 3.6-22, last paragraph: Blasting and ripping for construction through rock outcrops (or cliffs) is not just a concern for snakes. Several species of migratory birds also use these features for nesting, foraging, and other activities. We recommend revisions, accordingly.

Page 3.6-23, Mitigation section: This section should be expanded and improved with additional conservation measures. For eagles, we recommend that the following be added to the DEIS or included in a Migratory Bird Conservation Plan:

- From January 1 to August 31, Keystone XL will adhere to minimal spatial buffers for active bald eagle nests (1.0 mile) and golden eagle nests (0.75 mile). However, depending on the physical location of the nest (e.g., whether there are any natural barriers between the nest and the project) and the type of disturbance activity, these buffers could either be decreased or increased in size. For instance, the FWS has greater concerns for actions that generate high-decibel level noise, such as blasting and helicopter use, than for operating heavy equipment or pipe welding. Hence, the FWS recommends that Keystone use 1.0-mile buffers (for both species) for actions like blasting unless local landscape features reduce blasting impacts. Keystone XL will coordinate with the FWS and other appropriate natural resource agencies regarding these site-specific variances. Generally, for nesting bald eagles, Keystone XL will follow the FWS National Bald Eagle Management Guidelines (USFWS 2007).
- When active bald or golden eagle nests are located on or within 0.5 mile of the ROW, Keystone XL will coordinate with the FWS regarding appropriate measures to apply in conserving these species.

Other mitigation measures we recommend be included are:

- Whenever possible, Keystone XL will close all unnecessary roads after project construction is completed, and will revegetate these areas to restore the site to pre-construction habitat conditions. This is subject to approval from private landowners and affected land management agencies.
- For any communication towers constructed as part of the project, Keystone will implement applicable conservation measures from the FWS Guidance on the Siting, Construction, Operation and Decommissioning of Communication Towers (USFWS 2000).

Page 3.6-23: The DEIS states that, "If construction would occur during the raptor nesting season during January to August, pre-construction surveys would be completed to locate active nest sites to allow for appropriate construction scheduling." The final EIS should identify who will conduct the survey and provide a timeframe.

Page 3.6-23, Section 3.6.3: The same nest-dragging stipulation needs to be added to the mitigation section for the period of April 15 to July 15 for nesting migratory birds.

Page 3.6-25, paragraph 1: Rather than of a simple breakdown of the miles of different habitat types that will be impacted, we request a table displaying the acres that would be impacted in association with power line development. This should include a breakdown of acres by major habitat type and how many acres of impact would be permanent versus temporary.

Page 3.6-25, paragraph 2: The reference should be the Charles M. Russell NWR if you are referring to the wildlife refuge managed by the FWS in Montana. Also, there is a need to consult with the FWS staff of the Charles M. Russell NWR if any power lines are sited on their lands.

Page 3.6-25, paragraph 5: Language in this paragraph indicates measures would be taken to avoid collisions with power lines such as visually marking them with balls or flappers but does not state that wetland areas are a specific concern. Because waterfowl and other birds are

especially vulnerable to power line collisions when using wetland areas during migration stopovers, we recommend that priority be given to marking (and in some cases, burying) power lines in these areas.

The FWS recommends that an additional measure be added; that all power lines constructed as part of the project comply with applicable measures in the APLIC (1994) guidance document, "Mitigating Bird Collisions with Power Lines: The State of the Art in 1994."

Page 3.7-1, Fisheries section: Many species of wildlife, including many discussed in the Wildlife section-3.6, rely on fish species and aquatic invertebrates as a key food resource. The EIS should discuss this relationship in the Fisheries section, including how project actions that impact fisheries will have indirect impacts on wildlife species that depend on this prey base.

Page 3.7-21, Section 3.7.4.1: The DEIS discusses the number of wetlands crossed by power lines to substations. We recommend all power lines crossing and within 100 yards of wetlands be marked to reduce and minimize the incidence of migratory bird collisions.

Page 3.8-1, Threatened and Endangered Species and Species of Conservation Concern section: This part of the DEIS presents a lot of good information about federally- and state-listed species and other species of conservation concern. However, no references to State Wildlife Action Plans for any of the states crossed by the Keystone XL project are provided. State Wildlife Action Plans present the latest information for the states on species of conservation concern, threats, and management consideration. Omitting these Plans as a consideration seems like a significant shortcoming which should be corrected.

Page 3.8-2, paragraph 4: The DEIS states that candidate species are not federally protected. It is true that candidate species are not protected under the ESA. However, at least some candidate species are federally protected under the MBTA. This statement should be revised accordingly.

Page 3.8-2 The DEIS states that "the FWS-approved surveys were initiated in the summer and fall of 2008 and spring 2009 (Keystone 2009c)." The reference is to a supplemental filing; suggest the reference be to the actual survey, and electronic link, if available.

Page 3.8-23, ES.6.8, Page ES-14; Section 3.8.1.2: The DEIS indicates that Keystone XL would inform electrical power providers of the requirement to consult with the FWS on the effects of their electrical infrastructure.

Comment: As we explain in our General Comments (above), new power lines associated with the proposed project and will need to be included in the Keystone XL project consultation.

Page 3.8-7, paragraph 5: The brown pelican has been delisted at the Federal level. So, although this species may be discussed as having some listed status at a state level or a species of conservation concern, it should not be discussed as a federally listed bird species nor included in Table 3.8.1-1.

Page 3.8-8, paragraph 7: The DEIS text regarding greater sage-grouse should be updated

with the following: “the FWS initiated a status review to reevaluate this finding and on March 23, 2010, announced that the listing of the greater sage-grouse (rangewide) was warranted, but precluded by higher priority listing actions (FR 75, 13910). As a result of the FWS’s determination, the greater sage-grouse is a Federal candidate species.”

Page 3.8-11: The DEIS states that "Sage-grouse chicks are precocious and capable of leaving the nest immediately after hatching, but they are not sufficiently mobile to avoid construction related impacts until after they can fly." The final EIS should include a reference for this statement of fact.

Page 3.8-13, paragraph 2: We recommend the text be revised (in sentence 3) because least terns are considered waterbirds, not seabirds.

Page 3.8-13, paragraph 2: The DEIS states the nesting season for the interior least tern is from April 15 through September 15. Clarify that this is for the entire geographic nesting range of these birds and occurring later at more northern latitudes.

Page 3.8-14, paragraph 3: The DEIS states that no interior least terns were observed at the North Canadian or South Canadian rivers in Oklahoma, but foraging interior least terns were observed at the Red River on the Oklahoma and Texas border. The FWS believes the survey efforts were insufficient to confirm the presence or absence of the tern within the project area, as each area was only sampled for part of a day.

Pages 3.8-15 and 3.8-19, Section 3.8.2.1; Tables 3.8.1-3 and 3.8.1-4: Survey results for potential nesting habitat for interior least terns and piping plovers.

Comment: Interior least terns and piping plovers nest along river courses. Nesting habitat and nesting areas may change between and within breeding seasons, depending on river flow and renesting efforts. As noted in our general comments, surveys of potential nesting areas for presence of least terns and piping plovers 2 weeks prior to construction activities are insufficient to determine possible impacts from construction activities to the species. Surveys for presence of these species should be conducted whenever construction activities will take place within 0.25 mile of nesting areas between April 1 and August 15. If these species are present, construction should cease until presence of interior least terns or piping plovers are reported to the nearest FWS Ecological Services Field Office. Coordination with the FWS should take place before construction is resumed.

In addition to breeding on riverine sandbars and at sand/gravel mining operations, interior least terns and piping plovers migrate through the Great Plains during both the spring and fall and forage in rivers and associated wetlands. The species is susceptible to collision with power lines, and we recommend incorporating conservation measures to address potential adverse project impacts to these species. For example, power distribution lines may be marked with visual bird deflectors where they cross rivers (and within 0.25 mile of each side) and between rivers and sand and gravel mining areas to reduce potential for injury or mortality to interior least terns.

Page 3.8-16, paragraph 1: The DEIS states that limited vegetation clearing and limited human access would be required within the riparian areas: for the True Tracker Wire (3-foot wide,

hand-cleared path) used during horizontal directional drilling (HDD), and for withdrawing water for hydrostatic testing.

The FWS recommends a maximum 3-foot wide, hand-cleared path, and that no clearing be conducted during the interior least tern's breeding period (mid-April through mid-September). Installation and use of the True Tracker Wire and HDD should not be conducted during the interior least tern's nesting period.

Page 3.8-18, paragraph 2: The DEIS states, "The FWS Tulsa Ecological Services field office recommended the identification of suitable migration stopover habitats for piping plovers that would potentially be crossed by the project. Suitable migration stopover habitats include sandy shorelines of lakes and rivers (Campbell 2003). Review of the Gulf Coast Segment in Oklahoma identified suitable migration habitats at crossings of the North Canadian River and the South Canadian River in Oklahoma; and the Red River at the Oklahoma and Texas border."

Comment: The DEIS should note that the FWS further recommended, if suitable habitat was present and construction would occur during the spring and/or fall migration, surveys for the presence or absence of the plover in the river-crossing project be conducted immediately before (within 2 weeks) project construction is initiated.

Page 3.8-20: The DEIS states that "Since piping plovers are highly mobile, it is anticipated that individuals would move to other suitable resting and foraging habitats within the project region." The final EIS should include a reference for this statement.

Page 3.8-22 and 3.8-23, Section 3.8.1.2: The DEIS discusses whooping crane distribution and migration habitat, potential impacts, and conservation measures. It discusses collision hazards associated with power lines in the whooping crane corridor, concluding with the statement that there "...there is no indication, however, that any of these locations have been or would be used by whooping cranes."

Comment: In addition to riverine habitat, whooping cranes use palustrine and the edges of lacustrine wetlands and reservoirs throughout their migrational corridor. Whooping cranes are vulnerable to collision with any above-ground power lines in the vicinity of their roost sites, not just next to riverine roosts.

We recommend that the end of the first paragraph in subsection 3.1.3.2 be changed to read: "Areas used for roosting by migrating whooping cranes include broad, shallow channels of major river systems and their associated wetlands, as well as seasonally or semi-permanently flooded palustrine wetlands and shallow areas of reservoirs and other lacustrine wetlands. Habitat areas such as these that exist along the pipeline alignment may be affected by the project."

Where suitable whooping crane roost habitat exists in the vicinity of new power line construction and within the whooping crane migratory corridor, conservation measures to reduce the potential for collisions will need to be considered.

Page 3.8-24: The DEIS states that "This species [green sea turtle] nests in tropical and subtropical waters worldwide and inhabits shallow waters inside reefs, bays, and inlets, except during migration." The final EIS should include a reference for this statement.

Page 3.8-27, paragraph 5, Arkansas River Shiner: The DEIS states the Arkansas River shiner (shiner) is potentially present in the Cimarron River in Oklahoma. This should be corrected, as the shiner is known to be present in this location.

Page 3.8-28, paragraph 2: The DEIS shows that the Project would cross the North and South Canadian Rivers, and states that the Arkansas River shiner is known to occur in the South Canadian River and potentially occurs in the North Canadian River. In addition, the Project would cross designated critical habitat in the South Canadian River.

The FWS did not recommend surveys for the shiner in the South Canadian and North Canadian Rivers in Oklahoma because the presence of this species at these crossings is assumed. The FWS does, however, recommend that a 300-foot buffer from bank-full width be maintained on each side of the South Canadian River and North Canadian River. This is especially important along the South Canadian River due to the critical habitat. The FWS also recommends that a maximum 3-foot-wide, hand-cleared, path be constructed, and that no clearing be done during the shiner's spawning season (main channels in June to July, and possibly into August.)

Page 3.8-29: The DIES states that "This [pallid] sturgeon is adapted to habitat conditions that existed in these large rivers prior to their wide-scale modification by dams, diversions, and flood control structures. Habitats required by pallid sturgeon are formed by floodplains, backwaters, chutes, sloughs, islands, sandbars, and main channel waters within large river ecosystems." The final EIS should include a reference for this statement.

Page 3.8-33, Table 3.8.1-5, Suitable American Burying Beetle Habitat column: The Table uses the following terms under the Suitable ABB (*Nicrophorus americanus*) Habitat column: extensive, limited, unknown, and unlikely. We recommend that definitions for these terms be provided.

The DEIS also uses "historic, confirmed, and likely" for the Oklahoma portion of the project. We recommend the following definitions of these terms be included:

¹ Historical Range - According to specimen records, the recovery plan and available life history information, this county is within the documented historical range of the ABB.

² Non-Historical Range - This county is not within the documented historical range of the ABB. However, suitable habitat is present and this county is adjacent to at least one county with current positive findings, suggesting ABBs are likely to be present within this county.

³ Unconfirmed - Surveys within the last 15 years are lacking or insufficient to determine presence of the ABB. However, suitable habitat is present and this county is adjacent to at least one county with current positive findings. In some instances, occurrences of ABBs have been reported by reputable individuals, but identification has not been verified by a FWS biologist or trained entomologist.

⁴ Confirmed - Surveys within the last 15 years have documented the presence of the ABB within the county.

Page 3.8-33, paragraph 1: The DEIS states that construction would take place during the daylight hours and construction areas would not use artificial lighting, and concludes no impacts from artificial lighting during construction would therefore occur. This information should be reconciled with information provided in the DBA, stating that night construction might be necessary.

The DEIS also states soil heating associated with project operation could produce some increase in the activity period for the ABB, although the overall impacts of this increased activity would likely be negligible because species survival is more closely linked to its access to carrion and the availability of whole vertebrate carcasses (USFWS 2008c).

Soil moisture is believed to be an important habitat factor. An increase in soil temperature will result in decreased soil moisture. Consequently, ABBs could be affected.

Page 3.8-34, Section 3.8.1.6: The DEIS discusses conservation measures to avoid and minimize adverse impacts to the ABB, and states it is likely that all direct impacts to the ABB might not be avoided. However, the DEIS also states the project may affect, but is not likely to adversely affect, the ABB.

Comment: Conservation measures to avoid and minimize adverse Project effects to the species, and compensatory mitigation to offset some of the habitat losses, should be developed through further discussions with the FWS. It is the FWS' opinion that even if all the recommended conservation measures are implemented, take cannot be completely avoided. The FWS recommends that the DOS request initiation of formal consultation on the effects to ABB from the proposed project.

Page 3.8 to 34, paragraphs 3 and 4: The DEIS provides a list of state-specific conservation measures for the endangered ABB "that have been recommended by respective FWS offices." This list includes the statement that if "route changes and future surveys indicate the presence of the ABB in Lamar County, Texas, bait away or trap and relocate efforts would be undertaken prior to construction activities."

Comment: The FWS Ecological Services field office does not recommend the use of these procedures as a means to avoid impacts to ABBs in Texas. Rather, if ABBs are known to be present in a project area, we would offer construction planning recommendations to avoid impacts or minimize them to the point of insignificance. If adverse impacts were unavoidable, we recommend formal consultation. Because AECOM Environment's 2009 surveys did not find ABBs along the proposed pipeline ROW in Lamar County, Texas, we do not believe that adverse impacts are likely for a period of at least 1 year post-survey.

Page 3.8-37 and 3.8-38, Section 3.8.1.7: The DEIS provides an evaluation of potential impacts to threatened WPFs, and a finding of "may affect but is not likely to adversely affect would be appropriate."

Comment: The FWS does not concur with the DOS' "may affect but is not likely to adversely affect" determination. Interagency consultation, which is ongoing, will therefore need to be completed.

The rationale for the FWS' non-concurrence is based on the permanent disruptions of the proposed project activities, the extent of high quality WPFO habitat within the project ROW, and the fact that a WPFO specimen has been found 85 feet from the proposed project ROW despite erratic flowering patterns and long dormancies which make detection difficult.

Pages 3.8-41 to 3.8-43, and 3.8-56: The DEIS identifies several species of bats (Fringed myotis, Long-eared myotis, Northern myotis, Townsend's big-eared bat, Rafinesque's Big-Eared Bat) that could be encountered in the project area. Suggest the final EIS include information on population distributions, status, trends and a discussion of roosting, breeding, foraging, and migration patterns of the various species of bats that might be encountered along the project route. Much of this information is available in Ellison et al. 2003.

Page 3.8-42, Table 3.8.2-1 in Section 3.8.2: The swift fox discussion in the table is inadequate. The swift fox occurs along the pipeline route in Phillips County. The statement of no observations within five miles of the project is inaccurate. The BLM provided information in 2008 that said that the swift fox was present along the proposed route in Phillips County.

Page 3.8-56, State-Protected Animals and Plants section: Our earlier comment for page 3.8-1, regarding consideration of State Wildlife Action Plans applies to this section as well.

Page 3.8-57, Section 3.8.3.1: The swift fox discussion is also inadequate in this section. The statement about the Montana Natural Heritage Program (MNHP) database showing no records is inaccurate. The discussion is inconsistent when it says that the project occurs within swift fox range in Phillips County, but then says there are no records within five miles of the Project. The MNHP database on 05 May 2010 shows observation records for the past five years throughout the Phillips County portion of the project as well as a "high relative density" rating (27-34) for observations. The density probably gets higher as the project approaches Canada due to the proposed line getting closer to the center of occupied swift fox range.

Page 3.8-58, Section 3.8.3.1: The transmission line to PS-09 in Phillips County, Montana, goes through occupied swift fox habitat. This needs to be discussed and appropriate mitigation applied.

Page 3.8-60, Table 3.8.3-1 in Section 3.8.3.1: Presence in Frenchman Creek in Phillips County, Montana, needs to be included in the Comments block in the Table for the Northern Redbelly Dace and Pearl Dace.

Page 3.8-76, Section 3.8.3.4: The Northern Redbelly Dace and Pearl Dace occur in Frenchman Creek on the border of Phillips and Valley Counties, Montana, which would be crossed by the project pipeline (USGS's GAP Analysis Bulletin No. 12). The analysis should contain effects of the pipeline crossings on private land on the two fish species. Although the crossing is not on

BLM land, it is within a mile of a BLM portion of Frenchman Creek and habitat could be affected. Information on Northern Redbelly Dace was provided previously.

Page 3.8-77: The DEIS states that "...surveys have been recommended for the blacknose shiner, northern redbelly dace, and pearl dace in tributaries of the Keya Paha River . . . surveys have been recommended for the blacknose shiner, northern redbelly dace, and finescale dace in tributaries of the Niobrara and South Fork Elkhorn rivers ... project." Suggest the final EIS identify who will conduct the surveys and provide timeframes.

Page 3.8-80, Animals and Plants of Conservation Concern: Our earlier comment for page 3.8-1, regarding consideration of State Wildlife Action Plans applies to this section as well.

Page 3.9-14, 1st Line: Last paragraph in 3.9.4: This project is **not** part of the Powder River Resource Management Plan (March 1985).

Page 3.9-16, Section 3.9.6, 1st Line: The project would require the acquisition of temporary easements/**temporary use permits** and permanent easements/**ROW** with the landowners along the pipeline ROW.

Page 3.9-16, Section 3.9.6, 2nd Line: Pipeline construction would require temporary workspaces which would necessitate the negotiation of temporary ROW easements and **BLM temporary use permits not to exceed three (3) years**.

Page 3.9-16, Section 3.9.6, 3rd Line: Operation and Maintenance of the pipeline and ancillary facilities would require permanent ROW easements and permanent rights-of-way for the expected 50 year life of the project. However, BLM rights-of-way will only be issued for a term of 30 years.

Page 3.9-16, Section 3.9.6, 4th Line: Keystone would provide monetary compensation to landowners who grant easements, **ROW, and temporary use permits...maintenance**.

Page 3.9-17, 3.9.7, 4th Paragraph, 2nd Line: Keystone would require a 110-foot-wide construction ROW for installation of the 36-inch diameter pipeline, including a 60 foot temporary easement/**temporary use permit** and a 50-foot permanent easement/**right-of-way** (Keystone 2008).

Page 3.9-17, 3.9.7, Last Paragraph, 4th Line: Keystone would periodically inspect the entire pipeline, which would require occasional removal of woody vegetation and of trees from the permanent easement/**ROW**.

Page 3.11-1, 1st Paragraph Line 4: The word "American" should be replaced with "historic" so the text reads historic farmsteads. The term American seems to convey a sense that if the farmsteads were made by another ethnic group, it would not be considered a cultural resource.

Pages 3.11-1 – 3.11-4, Sections of Legislation: The detail on the various pieces of cultural resource legislation may not be appropriate for an EIS. It might prove more useful to put the

details of the legislation into an Appendix, and more briefly summarize how the legislation is related to the present project in the text.

Line 9: tries should be tribes

Section 3.11.1.2, National Register Line 13: Need to add that a cultural resource may be eligible if it is less than 50 years old and meets the exception criteria listed in 36 CFR 60.4

Page 3.11-4, Section 3.11.2.1 Description: This section seems unnecessary since the project is described elsewhere in the DEIS and reference can be made to those sections.

Page 3.11-5, Section 3.11.2.2: project Area. This section might be combined with Section 3.11.2.1 and shortened to the last sentence in the paragraph

Page 3.11-6, Montana 1st Paragraph: If crossed in the Montana portion of the pipeline, the EIS needs to add lands managed by U.S. Army Corps of Engineers and Bureau of Reclamation.

Page 3.11-7, File Search Results, Paragraphs 3-5 (distribution lines): BLM suspects that for many of the sites listed as not being eligible, (particularly the prehistoric sites), it is not that they are not eligible, but in many, if not most cases, the sites have never been formerly evaluated for National Register eligibility.

Page 3.11-13: NRHP Eligibility, 3rd Paragraph, Line 3: Since DOS is preparing a Programmatic Agreement that addresses potential Adverse Effects to Historic Properties, an MOA addressing impacts to individual historic properties would seem to be unnecessary.

Page 3.11-15, Section 3.11.3.1, 2nd Paragraph, lines 3-4: It needs to be explained why 21.36 miles of new pipeline corridor was examined when in the paragraph above it appeared that only 13.9 miles of powerline corridor remained to be examined. It would also be useful to know the acreage covered in the inventories of the 11 ancillary facilities mentioned in line 4 of the paragraph.

Page 3.11-16, Archaeological Sites 1st full Paragraph, Line 4: Explain the use of phrase “detrimental impacts” to sites. Conventionally, this is usually phrased as avoiding any adverse impacts to the sites.

Page 3.11-16, Historic Structures: It might be useful to note how the historic sites will be avoided (i.e. boring for canals and RRs).

Page 3.11-16: Lewis and Clark National Historic Trail: The BLM manages the Lewis and Clark National Historic Trail as a Special Recreation Management Area (SRMA) It would be in the SRMA where the pipeline crosses the Missouri near Fort Peck. There are management prescriptions with SRMA to avoid impacting the trail These are found in the ROD for the Big Dry RMP. These will need to be addressed.

Page 3.11-16, Stone Circles: Again BLM would question the need for a Memorandum of Agreement (MOA) for stone circle site mitigation when this should be covered in the PA for the project.

Page 3.11-16 – 3.11-27, Table 3.11.3-1: An additional column with surface ownership would be useful.

Page 3.11-27, 1st Paragraph, Does the 13.9 miles of pipeline remaining to be inventoried include the Montana DEQ's proposed route changes? If not, this data should also be included. Also, are there additional ancillary facilities in Montana requiring inventory?

Pages 3.11-49 – 3.11-50: Programmatic Agreement: Since the Programmatic Agreement will be the over riding document for Section 106 Compliance for the project, we would suggest replacing MOAs in earlier sections with the PA. This is said to be Appendix S. We do not see an Appendix S.

Page 3.11-50, Section 3.11.4.2, Federal and State Agency Consultation, 1st Paragraph: Should note BLM's role as cooperating agency in project. However, much of the consultation section for non-tribal entities roles is covered in Chapter One of the document and seems redundant here.

Page 3.11-51, Indian Tribal Consultation: Suggest removing the word "Indian" from the sub-heading. It would read Tribal Consultation.

Page 3.11-55, Section 3.11.5, Public Involvement: This section seems somewhat irrelevant to the cultural resources section of an EIS.

Page 3.11-56, Unanticipated Discovery Plans: This section should note the plan will be part of the programmatic agreement for the project.

Page 3.11-57: Given the length of this section, there should be a section that summarizes the information present in the previous 56 pages.

Page 3.14-10, Table 3.14.3-1: Is there a reason that cultural resources are not included in the cumulative affects table? The impacts would be similar to those identified for paleontology in the Geology Impacts. There would also be past actions since there are previous surveys and sites recorded in the project. There should not be any future effects since these would be addressed in the PA and Unanticipated Discoveries Plan.

Page 3.14-14, in Table 3.14.3-1: The statements made in this table for Wildlife resources are not sufficiently supported and do not adequately encompass the range of impacts to wildlife species associated with this project. Evidence should be provided to demonstrate that the proposed mitigation measures would minimize most long-term impacts on wildlife associated with this project. This statement should be revised and properly qualified to reflect the uncertainty of this outcome.

Page 3.14-23, paragraph 4: Construction and operation of the project would not just result in long-term habitat modification, a certain amount of wildlife habitat will be permanently lost and/or degraded. This statement should be revised accordingly.

Page 3.14-23, paragraph 5: As mentioned previously, the statement in the last sentence of this paragraph regarding how mitigation measures would minimize most long-term cumulative impacts on wildlife is not accurate. No facts are provided to support this statement as written. This sentence should be rewritten and properly qualified to reflect the uncertainty of this outcome.

Page 5, Section 5.0: “Additional Agency Proposed Mitigation Measures” Will these measures be employed? If not, the document should explain why not.

Page 5-14, 5.6 Wildlife, 5.6.2 Planned Mitigation Measures: The FWS recommends that this section of the EIS reference measures that would be included in a Migratory Bird Mitigation Plan to protect rookeries along the Gulf Coast (see our General Comments, above).

Page 5-15, 5.7.2 Additional Agency Proposed Mitigation: The FWS recommends the following pipeline monitoring conditions, jointly developed by the Corps’ Galveston District and associated resource agencies, be included as special conditions of any necessary permits within the boundaries of the Galveston District, particularly where the project goes through sensitive habitats or follows new ROW:

1. Aerial Imagery Protocol: The first report must utilize recent aerial imagery (within the last 5 years) of the permit area and an area 300 feet wide on each side of the permit area. The second report must utilize aerial images taken within 2 months of project completion. The third image must be taken approximately 1 year after pipeline construction is complete. The fourth image must be taken approximately 2 years after pipeline construction is complete. The aerial imagery must be color infrared, ortho-corrected, with a maximum of 6-inch pixel size, and +/- meters spatial accuracy, presented at a scale of 1 inch = 200 feet.
2. Ground Survey Protocol: Each restoration report will include Geographic Information System (GIS) analysis of the permit area, accompanied by a ground survey that includes sample points with geographic coordinates, a wetland data sheet percent of relative vegetation cover, and elevations for each change in plant community (described in the Corps 1987 Wetland Delineation Manual) throughout the entire permit area. The survey coordinates must have sub-meter accuracy; data must be recorded and submitted in North American Datum 1983 Universal Transverse Mercator zones and coordinates.
3. Geographic Information System /Remote Sensing Analysis Protocol: Each report must include aerial imagery of the permit area, and an area 300 feet wide on each side of the permit area with a GIS analysis of the aerial imagery. Survey reports will assess all existing plant communities, open water, and special aquatic sites (in acres) within the entire permit area. The GIS analysis must be submitted in the reports and an 8.5-inch by 11-inch hard copy. Upon request by Compliance, the applicant shall submit the GIS analysis in the Arcview Shapefile format with Federal Geographic Data Committee (FGDC) compliant

metadata, and all raster imagery in GeoTiff format with FGDC compliant metadata, on a CD-ROM.

Additional meetings may be needed to identify these areas of concern.

Page 5-15, 5.7 Fisheries, 5.7.2 Planned Mitigation Measures:

The FWS is currently performing a status review of nine species of freshwater mussels to determine if listing under the ESA is warranted. Although, these species are not yet listed, it would be prudent for the DEIS to evaluate direct and indirect impacts to the mussels from at pipeline crossings of freshwater streams. The project crosses or would potentially affects river, stream or tributary aquatic habitats, and the FWS therefore recommends that Best Management Practices (see attachment) be implemented during and after construction to reduce potential impacts of the project on mussels.

Appendix B General Comments: “Landowners” is used throughout the CMR Plan in regards to mitigation measures, monitoring, etc. It is unclear if the mitigation, monitoring, etc. applies to just private landowners or all lands. Many times the mitigation, monitoring, etc. shall apply to all lands regardless of ownership.

Section 1.0 – Introduction states: “The construction, mitigation, and reclamation requirements... include the following: uplands,...lands in public rights of way; and lands in private rights-of-way;”. It must be clear that the all construction, mitigation, and reclamation requirements, where necessary, shall apply to all lands.

Appendix B, Section 4.3, Page 18: “The actual depth of the topsoil” shall be stripped, “to a maximum depth of 12 inches” on USDI-BLM rangelands as well, not just “cultivated and agricultural lands.” “The Contractor shall perform work in a manner to minimize the potential for ~~so that~~ subsoil and topsoil ~~to be~~ **are not** mixed.”

Appendix B, Section 4.4, Page 19: Include the following language that is in Chapter 2.3.2.2: “Where the ground is relatively flat and does not require grading, rootstock will be left in the ground.”

Appendix B, Section 6.5.3, Page 51: Flooded Push/Pull Wetland Crossing Method: The DEIS states, “Where standing surface water or high groundwater levels make trenching difficult, trench widths up to 35 feet are common.”

Comment: We strongly recommend avoiding wetlands. Where avoidance is not feasible, we recommend directionally drilling under wetlands. The DEIS does not mention directionally drilling of wetlands as an option, we recommend this be included as an option in the FEIS. Directional drilling is especially important in wetlands that are unable to be crossed utilizing the “standard wetland crossing method” and potentially requiring a 35-foot trench width. We further recommend that a wetland mitigation plan be developed describing the different types, conditions, and sizes of wetlands that will be impacted and how these impacts will be mitigated. No net loss should be the goal of the wetland mitigation plan. This information should be part of the FEIS.

Appendix B, Section 7.2, Easement and Work Space: The DEIS states that the contractor shall locate all extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet from the water's edge if practicable...the Contractor shall install flagging across the construction ROW at least 10 feet from the water's edge prior to clearing and ensure that riparian cover is maintained where practicable during construction.

Comment: If wetland cannot be avoided altogether, buffer areas around wetlands should be a minimum of 100 feet to help maintain the buffering vegetation at the edge of the wetland. All wetland impacts should be mitigated, with specific mitigation measures to be coordinated with the FWS and the Corps.

Appendix B, page 62: The DEIS states that during hydrostatic test water withdrawals, the Contractor will maintain adequate flow rates in the water body to protect aquatic life and provide for downstream uses, in compliance with regulatory and permit requirements.

The term "adequate flow" is ambiguous and subject to the aquatic life being considered. Consequently, water withdrawal location, timing, and quantity from the North Canadian, Canadian, and Red Rivers must be coordinated with and approved by the Oklahoma Ecological Services field office prior to implementation of hydrostatic testing. These rivers support the Arkansas River shiner and the interior least tern. It is important to maintain adequate flow for these species. We recommend that water not be withdrawn directly from these major rivers, but rather from an upstream tributary. The withdrawal site from the upstream tributary should be at least 0.25 mile from the main river.

Appendix B, Section 4.11.1, Page 29: "The de-compacted construction right-of-way shall be tested...in agricultural and residential areas." This shall also apply to USDI-BLM rangelands.

Appendix B, Section 4.11.5.2, Page 32:
Recommend a much tighter spacing.

Slope (%) Spacing (feet)

2-4 200

5-9 100

>10 50

This is general guidance based on the short slope lengths with erodible soils within the proposed ROW on USDI-BLM lands. Some slopes will require an even tighter spacing to adequately control runoff and erosion.

Appendix B, Section 4.11.5.4, Page 34: It is unclear where these will be installed (i.e. a particular slope percent). This information should be specified.

Appendix B, Section 4.16, Page 42: "Post-construction...If, after the first growing season, revegetation is successful and erosion is controlled, no additional monitoring shall be conducted."

“In non-agricultural areas... adjacent undisturbed land or NRCS Ecological Site Description, whichever is appropriate.”

Appendix G Table edits:

Pipeline Segment	State	County	Beginning Milepost	Ending Milepost	Miles	Soil Series Survey Area	Soil Series Name Map Unit

Appendix H, Sandhills Native Rangelands: The DEIS states that a Best Management Practice would be to, “Attempt to locate the right-of-way in areas of higher soil moisture and greater soil structure while avoiding wetlands to the maximum extent possible.”

Comment: We appreciate the efforts and emphasize the need to avoid impacts to the Sandhills wetlands. Sandhills wetlands could include sensitive fens, bogs, and other unique wetlands with distinct assemblages of rare species. Restoration of such wetlands is difficult at best. We request that the FEIS commit to identifying wetland types, and that the project ROW avoid such wetlands.

Appendix I78, Section I-3.1.2-2: In Montana, low floodplain terraces occur at many stream crossings. For smaller intermittent and ephemeral drainages, these are typically narrow and *infrequently flooded*. This may not be accurate. “Therefore, after construction the pipeline would not obstruct flows over designated floodplains. In addition, there would be no aboveground facilities (pump stations or valves) in floodplains in Montana. As a result, the project would not affect floodplains in Montana.” This statement is incorrect suggested rewording “As a result, the project would not have permanent effects on floodplains in Montana.” Additionally the impacts are not addressed.

Appendix J, Section J-19: Sources are missing and need to be updated. ND and SD have 3 newer 303 (d) lists (2006, 2008, 2010) than the 2004 list

Appendix V, Distribution List

Comment: The Oklahoma Department of Wildlife Conservation apparently did not receive a copy of the DEIS. A copy should be provided to them and a suitable comment period allowed.

Appendix L, pages 14-16, Oklahoma City, Oklahoma, Figure 23 to Figure 27: The figures do not appear to support conclusions in the EIS that soil temperatures will remain unchanged. Please see our comments for section 3.2 regarding the need to correct/clarify soil temperature information.

If you have any questions regarding specific comments, please contact Mr. Dave Carlson, Coordinator for Conservation Planning Assistance in FWS’s Denver Regional Office, at [Dave E Carlson@fws.gov](mailto:Dave_E_Carlson@fws.gov) or telephone (303) 236-4254, Craig Haynes in the BLM’ S MSO, at (406) 896-5040, or to Jim Stobaugh, National Project Manager, assigned to process the

Keystone XL ROW project, at (775) 861-6478 or Gary LeCain, USGS Coordinator for Environmental Document Reviews, at (303) 236-5050 (x229) or at gdlecairn@usgs.gov

Attachment 2

The Department's FWS's Recommended Best Management Practices for Proposed Construction Activities Associated with Streams/Rivers

- Avoid earth moving activities or fill/bank armoring during native fish spawning periods from May 15 – July 31, construct stream crossings or other associated temporary embankments during low flow periods (usually July – September in Texas and Oklahoma, and August – October from Kansas to Montana);
- Minimize work area at stream locations: Cross streams, stream banks and riparian zones at right angles and at gentle slopes;
- Limit in-stream equipment use to that needed to construct crossings. Avoid driving equipment through the streambed. The majority of the work (including heavy equipment and storage sites) should occur above the high bank line;
- Construction equipment should cross the stream at one confined location over an existing bridge, equipment pads, clean temporary native rock fill, or over a temporary portable bridge;
- When feasible, directionally bore under stream channels;
- Implement comprehensive and effective erosion and sediment controls. These methods should be implemented and maintained for the duration of the project and considered at all stages of the project planning and design. Close attention is warranted for the placement and maintenance of temporary erosion control measures at the construction site to minimize sediment loading. These erosion/sediment control techniques should keep sediments from entering the stream and remain in place until work areas become re-vegetated and stable. Such erosion control measures may include properly placed sediment/silt screens or curtains and hay bales. Proper techniques are important to the placement of these types of structures and include trenching, staking and backfilling as well as using the appropriate number of bales. These techniques are best used in combination with each other rather than separately.
- Erosion and sediment controls should be monitored daily during construction to ensure effectiveness, particularly after storm events, and only the most effective techniques should be utilized. Clean, repair and replace structures as necessary.
- Exposed stream banks must be stabilized immediately after construction activity. Eroded surfaces should not be left exposed for greater than one day. If rain is predicted, no construction should commence unless eroded surfaces are immediately treated with geotextile fabric, mulch, seeding or some techniques that would stabilize the bank or exposed areas from eroding.
- Erosion repair and stream bank restoration should use appropriate bioengineering solutions.

- Develop and implement a hazardous materials safety protocol. This would include that all temporary storage facilities for petroleum products, other fuels and chemicals must be located and protected to prevent accidental spills from entering streams within the project area.
- Disturb riparian and floodplain vegetation only when necessary;
- Place trench spoil at least 25 feet away landward from stream banks;
- Use sediment filter devices to prevent movement of spoil off ROW when standing or flowing water is present;
- Trench de-watering, as necessary, should be conducted to prevent discharge of silt laden water into the stream channel;
- Maintain the current contours of the bank and channel bottom;
- Do not store hazardous materials, chemicals, fuels, lubricating oils, and other such substances within 100 feet of stream banks. Refuel construction equipment at least 100 feet from stream banks;
- Re-vegetate all disturbed areas as soon as possible after construction to prevent unnecessary soil erosion. Use only native riparian plants to help prevent the spread of exotics;
- Maintain sediment filters at the base of all slopes located adjacent to the streams until ROW vegetation becomes established;
- Maintain a vegetative filtration strip adjacent to streams and wetlands. The width of a filter strip is based on the slope of the banks and the width of the stream;
- Direct water runoff into vegetated areas.

FISRWG. 1998. Stream Corridor Restoration: Principles, Processes, and Practices. By the Federal Interagency Stream Restoration Working Group (FISRWG) (15 Federal agencies of the U. S. Government). GPO item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3.