4.7 FISHERIES

4.7.1 Introduction

This section describes potential impacts to Fisheries resources associated with the construction and operation of the proposed Project and connected actions and discusses mitigation measures that would avoid or minimize those impacts. The information, data, methods, and/or analyses used in this discussion are based on information provided in the 2011 Final Environmental Impact Statement (Final EIS) as well as new circumstances or information relevant to environmental concerns that have become available since the publication of the Final EIS, including the proposed reroute in Nebraska. The information that is provided here builds on the information provided in the Final EIS as well as the 2013 Draft Supplemental EIS and, in many instances, replicates that information with relatively minor changes and updates; other information is entirely new or substantially altered.

Specifically, the following information, data, methods, and/or analyses have been substantially updated from the 2011 document:

- A new section (see Section 4.7.2, Impact Assessment Methodology) has been added to explain the assessment methodology used to evaluate potential fisheries impacts associated with the proposed Project.
- The number and type of stream crossings and stream crossing methods have changed due to changes in the proposed Project route and updated field survey information provided by TransCanada Keystone Pipeline, LP (Keystone). The stream crossing assessment is comprised of a desktop analysis based on National Hydrography Dataset (NHD) information and supplemented by Keystone field survey descriptions where available.
- A discussion of the potential impacts of the installation of culverts or bridges for newly constructed access roads has been included.
- A discussion of the impacts associated with the potential increase in stream water temperature associated with the elevated oil temperature in the proposed pipeline has been included.

In response to public and agency comments, text throughout the section has been revised and expanded from the 2013 Draft Supplemental EIS where necessary.

Summary

Potential impacts to fisheries and aquatic resources associated with construction of the proposed Project and connected actions would vary depending on the waterbody crossing method, site-specific streambed conditions at each crossing, the duration of instream construction-related activity, and application of impact reduction measures. Crossing techniques for waterbodies would depend on stream size, the presence of sensitive resources, protection status, classification of the waterbody, and permit requirements. The proposed Project would cross waterbodies using one of the following methods: non-flowing open cut, flowing open-cut, dry flume open-cut, dry dam-and-pump, or horizontal directional drilling (HDD). Keystone proposes to use HDD techniques at 13 of the perennial waterbody crossings and various open-cut methods at the remaining 43 perennial stream crossings (see Figure 4.7.1-1). Note that two perennial waterbodies are each crossed three times, yielding 56 crossings of 52 separate perennial waterbodies.

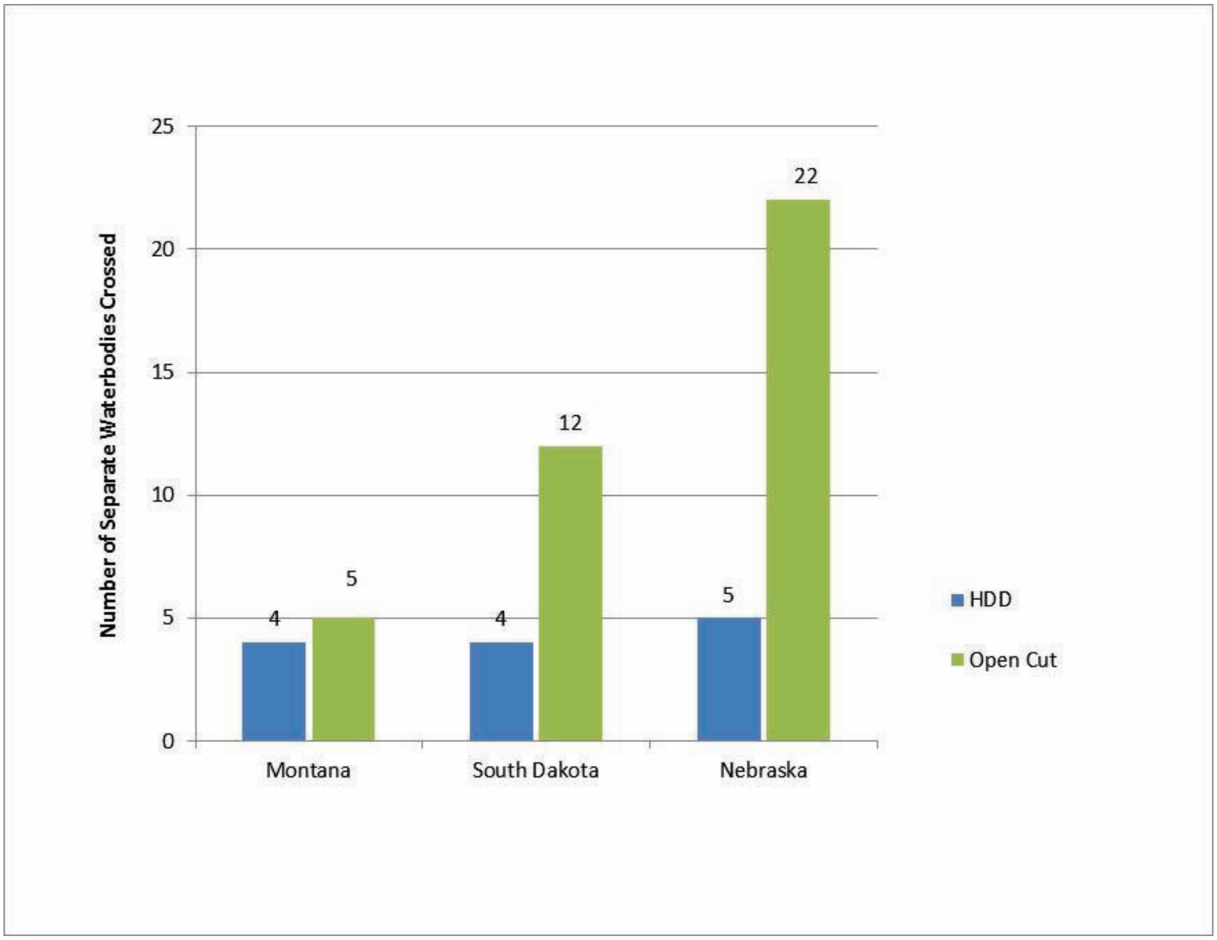

Figure 4.7.1-1 Perennial Waterbodies Crossed

Potential impacts to fisheries and aquatic resources from construction could include alteration of the streambed and bank structure, reduction or alteration of habitat, increased sediment, loss of riparian vegetation, increased water temperature, mortality, behavioral modifications, delays in movement, and introduction of non-native aquatic species (either plant or animal). To minimize impacts to fisheries and other aquatic species, the best management practices (BMPs) described in the Construction, Mitigation, and Reclamation Plan (CMRP) (see Appendix G) would be implemented, as well as any additional measures mandated within stream crossing permits issued by state and federal regulatory agencies. Measures specified in the CMRP include the following: expedited installation of sediment barriers, temporary slope breakers, maintaining a narrow right-of-way (ROW) width, minimization of grading and grubbing along stream banks, prompt removal of plant debris or soil inadvertently deposited at or below the high water mark, and riparian vegetation restoration.

Measures to reduce introduction of non-native species include temporary vehicle bridges, minimizing in-stream use of equipment, locating workspaces at least 10 feet from waterbodies, implementing erosion-control measures, and washing construction vehicles. Implementation of these and other similar measures would result in proposed Project impacts to fisheries resources that would be short term and temporary.

Water withdrawal and discharge for hydrostatic testing, HDD operations (drilling mud), and dust control could potentially impact fisheries and aquatic resources through reduced streamflow, which may result in reduced habitat quantity and quality including increased water temperature; entrainment of fish, eggs, and invertebrates; transfer of aquatic invasive species; and increased sediment. The potential for increased water temperature may result from reduced streamflow, as flow rates may have a direct effect on water temperatures. As flow decreases, the amount of energy required to change water temperature also decreases. In addition, discharged and augmented flows may further entrain sediment, leading to increased turbidity, which may result in increased temperature due to greater solar radiation absorption by the darker sediments in the water column. Measures to minimize or avoid these impacts include controlling water withdrawal rates, using alternative water sources (wells or municipal sources), use of fine mesh screens at intakes, discharge in upland locations, and energy dissipating structures as outlined in the CMRP (see Appendix G).

Potential impacts to fisheries resources during the operational phase of the proposed Project and connected actions include reduced riparian vegetation, increased water temperature, herbicide contamination, increased bank erosion, and sedimentation. Measures to avoid and minimize these impacts include aerial and ground surveillance to allow for early detection of bank stability problems and to minimize the potential for continued environmental impacts during pipeline operation, maintenance of non-forested vegetation, restrictions on herbicide use near waterbodies, use of licensed applicators for herbicides, and restoration and revegetation measures presented in the CMRP. The burial depth of the proposed pipeline could mitigate potential temperature impacts, as typical pipeline burial depth under streams would be a minimum of 60 inches; HDD installation would locate the pipeline even deeper below the river bottom, thus further mitigating for potential temperature increases to streamflow. Temperature impacts would also depend on multiple variables including antecedent water temperature, flow rate, volume, and substrate type. The permit requirements of federal, state, and local regulatory agencies could further reduce potential impacts to fisheries and aquatic resources from these activities.

Connected actions include the Bakken Marketlink Project, the Big Bend to Witten 230-kilovolt (kV) Transmission Line, and electrical distribution lines and substations. The potential impacts to fisheries resources associated with the Bakken Marketlink facilities would likely be similar to those described for the proposed Project route in that area. The Bakken Marketlink Project would cross one perennial stream in Montana which supports recreational or commercial fish species. In general, transmission line and electrical distribution line construction impacts are short term and/or negligible to fisheries and aquatic habitat because these lines typically span surface waterbodies, parallel existing roadways or ROWs, and would be installed under local permitting requirements. Compliance with federal, state, and local agency requirements for water crossings would ensure activities that are the most feasible and of lowest impact are performed at the site.

4.7.2 Impact Assessment Methodology

The impacts from construction and operation of the proposed Project on fisheries, aquatic resources, and protected species have been evaluated using a qualitative assessment of the potential direct and indirect impacts to species and their habitat through literature review, consultation with regional biologists, and the results of field studies, where available.

4.7.3 Potential Impacts

Potential impacts to fisheries resources associated with construction and operation of the proposed pipeline are addressed in this section. Impacts associated with potential spills of oil or other hazardous substances are addressed in Section 4.13, Potential Releases.

The proposed Project has the potential to impact special status fish species including federal threatened, endangered, proposed and candidate species, Bureau of Land Management (BLM) sensitive species, state threatened and endangered species, and species of conservation concern. The potential impacts to these species are discussed in Section 4.8, Threatened and Endangered Species and Species of Conservation Concern, and in Appendix H, 2012 Biological Assessment, 2013 U.S. Fish and Wildlife Service (USFWS) Biological Opinion, and Associated Documents. Disturbance to upland plant communities and soil could have indirect impacts on aquatic habitats through increased sedimentation due to wind and water erosion as well as a reduction in filtering capacity and infiltration of runoff due to reduced vegetative cover. Impacts to upland areas and measures to minimize erosion associated with disturbance of upland areas are discussed in Section 4.3, Water Resources, and Section 4.5, Terrestrial Vegetation.

The facilities to be located in North Dakota (pipe yard and rail siding) and in Kansas (pump stations) would have no impact to fisheries resources as no surface water resources containing fisheries were identified in those locations.

To minimize potential impacts to fisheries resources, Keystone would implement a CMRP (see Appendix G), which contains measures for use at and near waterbody crossings to reduce potential effects on fish and aquatic/stream bank habitat.

4.7.3.1 Introduction of Invasive/Non-Native Species

Introduced non-native species can compete with native species and transmit diseases (e.g., whirling disease) that could adversely impact sensitive fish species. Invasive aquatic species (either plant or animal) can be introduced into waterways and wetlands, and can be spread by improperly cleaned vehicles and equipment operating in water, stream channels, or wetlands (Cowie and Robinson 2003, Fuller 2003). Some invasive organisms can live in dry equipment for several days. Whirling disease in salmonids is caused by a protozoan parasite (*Myxobolus cerebralis*), which has a resistant myxospore stage. The disease causes skeletal deformation and neurological damage in juvenile fish. Myxospores can be transmitted in mud from infected streams on equipment used in water and on vehicles between watersheds. Whirling disease occurs in over 100 different streams with only a few major river drainages uninfected in Montana (Montana Aquatic Nuisance Species Technical Committee 2002). New Zealand mudsnails (*Potamopyrgus antipodarum*) have been reported from the Big Horn River drainage, a tributary to the Yellowstone River in Montana (Benson 2009a), which is over 160 river miles upstream of the proposed Project area. Quagga mussels (*Dreissena rostriformis bugensis*) have been reported from the South Platte River, a tributary to the Platte River in Nebraska (Benson

2009b), which is over 150 river miles upstream of the proposed Project area. In spite of these distances, it is important to recognize the presence of invasive and non-native species located in upstream drainage basins of the proposed route. These invasive species have the ability to spread rapidly, particularly in the downstream direction. While proposed project activities are not likely to cause non-desirable species to spread, the following preventative measures would be implemented.

To reduce the potential for transfer of aquatic pathogens, temporary vehicle bridges would be used to cross waterbodies in order to limit vehicle contact with surface waters and sediments. During open-cut pipeline installation, in-stream activities would be conducted outside of the waterbody channel as much as practical and would limit the use of equipment within waterbodies. Workspaces would be located at least 10 feet from waterbodies and would implement erosion-control measures to reduce suspended sediment loading in waterbodies. These measures would also limit waterbody contact with vehicles and mud that could potentially serve as vectors for invasive species and whirling disease. Construction vehicles would be washed to remove mud and dirt that may collect on equipment. Washing would be accomplished in specified areas and washwater would not be allowed to enter any waterbody, wetland, or irrigation canal or ditch per the CMRP (see Appendix G).

4.7.3.2 Construction Impacts

The degree of construction-related impacts to fisheries resources within waterbodies that would be crossed by the proposed Project route would depend on the crossing method, site-specific streambed conditions at each crossing, the duration of instream construction-related activity, and application of impact reduction measures. Crossing techniques for waterbodies would depend on stream size, the presence of sensitive resources, protection status, classification of the waterbody, and permit requirements (see Section 2.1, Overview of the Proposed Project, for construction method details). The proposed Project would cross waterbodies along the proposed Project route using one of the following techniques as described in detail in the CMRP (see Appendix G):

- Non-flowing open-cut crossing method;
- Flowing open-cut crossing method;
- Dry flume open-cut crossing method;
- Dry dam-and-pump open-cut crossing method; and
- HDD crossing method.

Crossing methods for each waterbody potentially containing fishery resources are identified in Table 4.7-1. Keystone proposes to use HDD techniques at 13 of the perennial waterbody crossings[1] and various open-cut methods at the remaining 43 perennial stream crossings. Aquatic surveys in those waterbodies where open-cut methods have been proposed have been conducted since 2008, and surveys for the proposed Nebraska reroute were conducted in summer and fall 2012 and are continuing in summer 2013.

[1] One additional HDD crossing would be made at Bridger Creek, which is an intermittent stream, for a total of 14 HDD waterbody crossings.

Table 4.7-1 Proposed Perennial Stream Crossings along the Proposed Project Route

County	Approximate Milepost	Waterbody Name	Proposed Crossing Technique[a,b,c]	Relevant Surface Water or Fishery Class/Rating
Montana				
Phillips	25	Frenchman River	HDD	Non-Salmonid
Valley	39	Rock Creek	Open Cut	Non-Salmonid
Valley	40	Willow Creek	Open Cut	Non-Salmonid
Valley	83	Milk River	HDD	Non-Salmonid
Valley/ McCone	90	Missouri River	HDD	Marginal Salmonid/Red Ribbon, Class II Recreational Fishery
Dawson	198	Yellowstone River	HDD	Non-Salmonid/Blue Ribbon, Class I Recreational Fishery
Fallon	247	Sandstone Creek	Open Cut	Non-Salmonid
Fallon	265	Little Beaver Creek	Open Cut	Non-Salmonid
Fallon	285	Boxelder Creek	Open Cut	Non-Salmonid
South Dakota				
Harding	293	Shaw Creek	Open Cut	Fish Propagation
Harding	295	Little Missouri River	HDD	WW Semi-permanent
Harding	300	Kimble Creek	Open Cut	Fish Propagation
Harding	304	Unnamed Tributary to Dry House Creek	Open Cut	Fish Propagation
Harding	322	South Fork Grand River	Open Cut	WW Semi-permanent
Harding	326	Clarks Fork Creek	Open Cut	WW Marginal
Butte	361	North Fork Moreau River	Open Cut	WW Marginal
Perkins	369	South Fork Moreau River	Open Cut	WW Marginal
Meade	388	Pine Creek	Open Cut	WW Marginal
Meade	428	Narcelle Creek	Open Cut	Fish Propagation
Meade	430	Cheyenne River	HDD	WW Permanent
Haakon	486	Bad River	HDD	WW Marginal
Jones	498	Dry Creek	Open Cut	Fish Propagation
Tripp	541	White River	HDD	WW Semi-permanent
Tripp	547	Cottonwood Creek	Open Cut	Fish Propagation
Tripp	600	Buffalo Creek	Open Cut	Fish Propagation
Nebraska				
Keya Paha	602	Unnamed Tributary to Buffalo Creek [d]	Open Cut	Class B Warmwater
Keya Paha	611	Wolf Creek	Open Cut	Class B Coldwater

County	Approximate Milepost	Waterbody Name	Proposed Crossing Technique[a,b,c]	Relevant Surface Water or Fishery Class/Rating
Keya Paha	613	Unnamed Tributary to Keya Paha River	Open Cut	None
Keya Paha	614	Spotted Tail Creek	Open Cut	Class B Coldwater
Keya Paha	614	Unnamed Tributary to Spotted Tail Creek	Open Cut	None
Keya Paha	617	Alkali Creek	Open Cut	Class B Warmwater
Boyd	618	Keya Paha River	HDD	Class A Warmwater
Holt	626	Niobrara River	HDD	Class A Warmwater
Holt	627	Beaver Creek	Open Cut	Class B Coldwater
Holt	633	Big Sandy Creek	Open Cut	Class A Warmwater
Holt	640	Unnamed Tributary to Brush Creek	Open Cut	Class B Coldwater
Holt	640	Unnamed Tributary to Brush Creek	Open Cut	Class B Coldwater
Holt	647	North Branch Eagle Creek	Open Cut	Class B Coldwater
Holt	649	Middle Branch Eagle Creek	Open Cut	Class B Coldwater
Holt	653	East Branch Eagle Creek	Open Cut	Class B Coldwater
Holt	663	Redbird Creek [d]	Open Cut	Class B Warmwater
Holt	680	South Branch Verdigre Creek	Open Cut	Class B Coldwater
Antelope	683	Big Springs Creek	Open Cut	Class B Coldwater
Antelope	713	Elkhorn River	HDD	Class A Warmwater
Boone	744	Beaver Creek	Open Cut	Class A Warmwater
Nance	760	Plum Creek	Open Cut	Class B Warmwater
Nance	762	Loup River	HDD	Class A Warmwater
Nance	767	Prairie Creek	Open Cut	Class B Warmwater
Polk	775	Platte River	HDD	Class A Warmwater
York	803	Beaver Creek	Open Cut	Class B Warmwater
York	813	West Fork Big Blue River	Open Cut	Class A Warmwater
Fillmore	832	Turkey Creek	Open Cut	Class B Warmwater

Sources: Geographic Information System data source for waterbody name—U.S. Geological Survey NHD (U.S. Geological Survey 2012); data source for Montana—Montana Department of Environmental Quality (MDEQ) 2012; data source for South Dakota—South Dakota Department of Environment and Natural Resources 2012 and South Dakota Legislature 2012; data source for Nebraska—Nebraska Department of Environmental Quality 2012.

[a] Open cut = one of the four open-cut methods (i.e., non-flowing, flowing, dry flume, or dry dam-and-pump) to be used for these crossings. In Montana, the dry flume or dry dam-and-pump method would be used at crossings where water is present at the time of construction.
[b] HDD = horizontal directional drill
[c] The HDD method would also be used to cross one intermittent waterbody (not listed in this table): Bridger Creek (Milepost 434).
[d] This waterbody would be crossed three times at the same approximate location (i.e., due to several meanders intersecting the proposed pipeline centerline).

Site-specific crossing plans would be developed for waterbodies that would be crossed by the proposed pipeline, if required by the applicable regulatory agencies during the permitting process. Several site-specific crossing plans for HDD crossings have been developed and are presented in the CMRP. Further, state agencies would be consulted and relevant U.S. Army Corps of Engineers permitting and consultation and USFWS consultation would be completed to determine specific open-cut crossing and construction methods to reduce proposed Project impacts to fishery resources. As an example, the State of Montana noted in their Environmental Specifications (see Appendix N, Supplemental Information for Compliance with the Montana Environmental Policy Act) that no flowing open-cut crossing methods would be allowed in Montana.

To minimize the amount of sediment from stream bank and upland erosion entering waterbodies, the BMPs described in the CMRP (see Appendix G) would be implemented, as well as any additional measures mandated within stream crossing permits issued by state and federal regulatory agencies. Measures specified in the CMRP include the following:

- Installation of sediment barriers immediately after initial disturbance of waterbodies or adjacent uplands;
- Minimization of grading and grubbing along stream banks; and
- Prompt removal of plant debris or soil that is inadvertently deposited at or below the high water mark.

Implementation of these and other similar measures to reduce suspended sediment loads would result in proposed Project impacts to fisheries resources that would be short term and temporary.

To further reduce the potential impacts to fisheries habitat caused by removal of riparian cover, grading and grubbing of waterbody banks would be minimized. For the most part, grubbing would be limited to the proposed pipeline trench and vehicle access areas. Additional workspace would be located at least 10 feet from waterbodies to minimize riparian disturbance. The banks of the waterbodies would be stabilized with temporary sediment barriers within 24 hours of completing proposed construction activities, if practicable, and most open-cut waterbody crossings would be completed within 2 to 3 days. Where conditions allow, riparian vegetation would be restored with native plants; in wetlands where no standing water is present, the construction ROW would be seeded to supplement regenerated growth from root stock from original excavation of soils, in accordance with the recommendations of the U.S. Army Corps of Engineers, local soil conservation authorities, or land management agency. In the event that a waterbody crossing would be located within or adjacent to a wetland crossing, wetland crossing impact reduction measures would be implemented to the extent practicable.

Compliance with mitigation measures mandated in permit conditions established by state and federal agencies would occur in addition to the measures included in the CMRP (see Appendix G) to protect fisheries resources. In Montana, compliance with fisheries and waterbody protection measures (as described in Appendix N, Supplemental Information for Compliance with the Montana Environmental Policy Act) would be required. On federal lands in Montana, compliance with fisheries mitigation measures attached to the federal grant of ROW would be required. Also required would be compliance with conditions in South Dakota that were developed by the South Dakota Public Utility Commission and attached to its Amended Final Decision and Order, Notice of Entry HP09-001.

Impacts and mitigation measures for specific waterbody crossing methods are described in the following sections. As required by the Montana Department of Environmental Quality (MDEQ) for Nationwide Permits, water must be diverted, pumped, or flumed around the trench at pipeline crossings where water is present. Accordingly, either the dry dam-and-pump or the dry flume open-cut crossing method would be used in Montana if water is present at the time of construction. For Standard Permits, separate Section 401 verification from the MDEQ would be required.

Potential Impacts Associated with Open-Cut Crossings

Potential impacts resulting from all open-cut crossing methods include disturbance of the streambed, resulting in impacts to subsurface macroinvertebrates (invertebrates that can be seen without the use of a microscope) and potential interference with hyporheic flows (mixing of shallow groundwater and surface water). Construction would result in a potential reduction of habitat, alteration of habitat structure, alteration of substrate and bank structure, and changes in the benthic invertebrate community (Levesque and Dube 2007, Brown et al. 2002, Chutter 1969, Cordone and Kelley 1961).

Open-cut methods could potentially increase the amount of sediment entering waterbodies during construction due to erosion of the excavated bank and streambed. The level of temporary elevated suspended sediment loading would depend upon the selected open-cut method as well as characteristics of the stream and adjacent uplands. Excessive suspended sediment can interfere with respiration in fish and invertebrates, leading to mortality or reduced productivity in rearing and spawning (Newcombe and Jensen 1996, Sutherland 2007, Wood and Armitage 1997). Suspended sediment could result in short-term impairment of foraging efficiency for species that are visual predators. Longer-term effects could occur if sediment covers spawning gravels, preventing water exchange and oxygen to developing eggs or young fish (sack or emerging fry), causing increased mortality, and reducing recruitment to the population (Newcomb and MacDonald 1991).

The quantity, cover, and type of riparian bank vegetation vary depending upon site-specific waterbody conditions and locations. Removal of bank vegetation (including overhead cover) could lead to bank instability and erosion. Loss of riparian vegetation reduces shading, causing an increase in water temperature and a reduction in dissolved oxygen, nutrient input, food input, and hiding cover (Brown et al. 2002, Ohmart and Anderson 1988). A reduction in escape cover can increase vulnerability of certain species to predation. Loss of riparian vegetation and disturbance to the bank and substrate can alter benthic communities and change food availability (Brown et al. 2002). Trenching in the stream could cause a local increase in water temperature due to increased turbidity; the increased temperature as well as the turbidity could result in a temporary reduction in water quality and short-term impacts to fish and macroinvertebrates.

Planned mitigation measures include revegetation of riparian areas upon construction completion (see Section 4.5, Terrestrial Vegetation), limiting the extent of riparian vegetation loss during construction, maintaining a narrow ROW width, and using dry-ditch techniques at crossings where the timing of construction does not adequately protect environmentally sensitive waterbodies, as determined by the appropriate regulatory authority. These mitigation measures would reduce the potential impacts associated with all open-cut crossing methods.

Non-Flowing Open-Cut Crossings

The non-flowing open-cut method would be used in dry washes, swales, ephemeral streams, and other drainages when there is no flowing water. Impacts to aquatic resources would be minimal during construction activities as few, if any, aquatic resources would be present. There may be viable benthic organisms if the moisture content of the streambed is sufficient in the area being trenched, resulting in a short-term, direct impact to these animals. Once water returns to the crossing site, sediment loosened by trenching activities, bank erosion, and wind-driven erosion could wash sediments downstream, causing an increase in sediment deposition downstream. This could affect fish and benthic communities, if any are present, downstream of the crossing.

Typical mitigation measures would include installation of sediment barriers, temporary slope breakers (water bars), mulching, stabilization of slopes including initiation of revegetation of disturbed soils within 24 hours of pipeline crossing completion, at steep slopes the installation of rip rap or rock gabions, grading to keep sediments from entering the water course, and restoration of the banks to as close to the original slope and contours as practicable. Rip rap is a type of constructed rock bank revetment typically placed along a channel margin in order to stabilize the bank and inhibit or reduce erosion. Similarly, rock gabions are typically heavy gage wire rectangular baskets that are filled with rock to form a stable foundation or toe of the bank slope. These mitigation measures are discussed in greater detail in the CMRP (see Appendix G).

Implementation of the mitigation measures would result in temporary impacts to fisheries and aquatic organisms associated with this crossing technique. The primary potential impact would be an increase in sedimentation to downstream habitats. As water returns to the dry streambed, however, a naturally occurring increase in sedimentation would be expected as dry sediments are re-suspended and carried downstream with the flow. The potential increase in sediment load from the trenching activities would likely be negligible as it mixes with natural streambed materials, provided that bank stabilization methods have been employed such that there is not a significant increase in bank erosion.

Flowing Open-Cut Crossings

The typical flowing open-cut crossing method allows the construction spread to move more quickly and reduces the amount of time the waterbody is subjected to construction disturbance. It is generally the preferred construction crossing method to reduce construction time and expense. However, it is not always practicable, and construction of flowing open-cut crossings may result in additional short-term impacts, including direct mortality to fishery and aquatic resources from direct in-stream trenching and backfilling. Sediment released during trenching of the proposed pipeline crossings would be transported by the water flowing through the trench, and has the potential to affect downstream aquatic life and habitat through either direct exposure or sediment deposition (Schubert et al. 1985, Anderson et al. 1996, Reid et al. 2004). Biological effects associated with fine sediment on fishes can vary and include gill irritation, avoidance behaviors, stress, and, in extreme cases, long durations of exposure to suspended sediments, which can have lethal effects on individuals (Newcombe and MacDonald 1991, Wood and Armitage 1997, Waters 1995).

The length and extent of direct elevated suspended sediment plumes (and associated biological impacts) would depend upon the waterbody flow, disturbed sediment particle size, implementation of BMPs, type of installation activity, and duration of instream disturbance

(Reid and Anderson 1998, Levesque and Dube 2007). Sediment deposition and elevated suspended sediment from open-cut trenching and backfilling have been shown to have effects on waterbody substrates and benthic invertebrate communities that can last from hours to years depending on site-specific conditions and installation activities (Levesque and Dube 2007). The highest rate of suspended sediment elevation (and associated potential impacts on aquatic resources) from open-cut installation typically occurs during instream trenching. Typically, the sedimentation effects from instream trenching on aquatic biological resources are minor, and elevated suspended sediment in the water column returns to background levels within hours to days of instream disturbance (Levesque and Dube 2007).

As described in the CMRP (see Appendix G), instream trenching and backfill work periods would be carried out quickly (24 hours for minor, 48 hours for intermediate, and in accordance with the site-specific plan for major waterbodies, as practical) to minimize the time period in which sediment could be suspended by construction activities. BMPs would be implemented, as described in the CMRP, to minimize sediment from stream bank and upland erosion entering waterbodies. Based on the implementation of the measures described in the CMRP and additional measures mandated by state and federal permit agencies, elevated suspended sediment from proposed Project construction would be short term and temporary. Potential longer-term impacts after construction could include scouring of downstream areas or streambed disturbance if streambed modifications occur.

Dry Flume and Dry Dam-and-Pump Open-Cut Crossings

The dry flume or dry dam-and-pump open-cut methods would be used when crossing selected environmentally sensitive waterbodies. These methods have a potential to temporarily affect fishery resources, possibly resulting in behavioral changes such as avoidance or stress on individuals. Pump failure during flowing open-cut dam-and-pump crossings may result in overtopping of the temporary dam, causing erosion and subsequent transport of suspended and fine sediment. To address this potential impact, a pump capable of maintaining 1.5 times the ambient flow rate at the time of construction would be used (see Appendix G, CMRP). Additionally, at least one backup pump would be available on site, and dams would be constructed with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner). Intake hoses would be screened to prevent entrainment of fish, although microinvertebrates (invertebrates of microscopic size, too small to be seen with the naked eye) may be transferred through the pump. In summary, the dam-and-pump open-cut crossings have a potential to temporarily affect fishery resources. Dam-and-pump crossings may block or delay normal fish movements. Short-term delays in movements of spawning migrations could have adverse impacts on fisheries; however, most crossings of streams less than 100 feet would be completed in less than 48 hours, and potential impacts would be temporary.

HDD Crossings

The HDD method for crossing waterbodies would be used to minimize disturbance to aquatic habitat, stream banks, and recreational or commercial fisheries. Impacts could occur if there is an unintended release of drilling fluids (i.e., a frac out) during the HDD operation. A frac out could release bentonitic drilling mud into the aquatic environment. The released drilling mud would readily disperse in flowing water or eventually settle in standing water. Although bentonite is non-toxic, suspended bentonite may produce short-term impacts to the respiration of fish and aquatic invertebrates due to fouled gills. Longer-term effects could result if larval fish are covered and suffocate due to fouled gills and/or lack of oxygen. If the frac out occurred during a spawning period, egg masses of fish could be covered, thus inhibiting the flow of dissolved oxygen to the egg masses. Benthic invertebrates and the larval stages of pelagic organisms could also be covered and suffocate.

To minimize the potential for these impacts to occur, a contingency plan would be implemented to address an HDD frac out. This plan would include preventive and response measures to control the inadvertent release of drilling fluids. The contingency plan would also include instructions for downstream monitoring for any signs of drilling fluid during drilling operations, and would describe the response plan and impact reduction measures in the event a release of drilling fluids occurred. Drill cuttings and drilling mud would be disposed of according to applicable regulations; disposal/management options may include spreading over the construction ROW in an upland location or hauling to an approved off-site, licensed landfill or other approved sites.

Water Withdrawals

Water would be withdrawn for hydrostatic testing, HDD operations (drilling mud) and dust control from nearby rivers and streams, privately owned reservoirs, and/or municipal sources. At this time, Keystone has identified the following waterbodies as potential water withdrawal sources:

- Frenchmen River
- Milk River
- Missouri River
- Yellowstone River
- Little Missouri River
- Gardner Lake
- North Fork Moreau River
- Cheyenne River
- Bad River
- White River
- Keya Paha River
- Niobrara River
- Elk Horn River
- Loup River
- Platte River

Water withdrawal rates would be controlled to be less than 10 percent of the baseflow of the source waterbody at the time of testing. Generally waterbodies would not contain sufficient water for use in hydrostatic testing. Surface water withdrawal permits from larger rivers with existing water rights would be regulated by state regulatory agencies to preserve existing water rights and environmental requirements. If inadequate water is available from rivers, Keystone would use alternative water sources nearby such as local private wells or municipal sources for HDD operations, hydrostatic testing the mainline, and dust control, as allowed by regulatory agencies. Keystone has indicated that in the event surface water is unavailable, groundwater would be used for HDD operations, hydrostatic testing, and dust control. Water would be purchased from nearby willing sellers with available water rights and would not increase overall groundwater use. Volume, duration, and/or frequency of groundwater use is administered and regulated by respective State agency(s) and/or local irrigation districts. Additional discussion of water sources is provided in Section 4.3.3.2, Surface Water.

Water withdrawal from well sources adjacent to stream and river can influence stream flows. This would only occur if the well is hydraulically connected to the stream or river and associated with a shallow aquifer. Reductions in streamflows can reduce aquatic habitat quantity and quality including reduced spawning, egg development, and juvenile rearing habitats, and increased water temperature. The potential for increased water temperature may result from reduced streamflow, as flow rates may have a direct effect on water temperatures. As flow decreases, the amount of energy required to change water temperature also decreases. Mitigation for this potential impact include limiting water withdrawals to wells that are not hydraulically connected to the adjacent stream or river and limiting the water withdrawal such that less than 10 percent of the flow of the stream is effected (this is only applicable to rivers with substantial flows). Further, aquatic resources would be protected as withdrawal rates could be limited by conditions mandated by applicable local, state, and federal permits.

If water is withdrawn from a surface water source during a low-flow period or at a time when particular flow ranges are needed for other uses, habitat reductions for fisheries and aquatic invertebrates could occur. If construction permits are granted, Keystone would equip the hydrostatic test water intake structure (often a large box-type structure) with fine mesh wire screens to prevent the entrainment of fish and reduce the entrainment of invertebrates as described in the CMRP (see Appendix G). Although some eggs, ichthyoplankton (drifting fish eggs and larvae), and drifting invertebrates could still be entrained, eggs would not be captured if water is withdrawn outside of the spawning and egg development timing window. In addition, the abundance and rapid reproduction rate of invertebrates would limit impacts to these species.

To reduce the potential for transfer of aquatic invasive species resulting from hydrostatic testing, hydrostatic test waters would not be discharged to watersheds outside of the withdrawal basins (i.e., no inter-basin transfers). In some locations, hydrostatic test water would be discharged to upland locations within the same basin, relying on infiltration for eventual return to the basin. In other locations, water would be returned to its waterbody of origin. Proportionally high discharge volumes to source areas could displace fish or disrupt spawning, rearing, or foraging behavior (Manny 1984). Discharged water may dislodge sediment, leading to an increase in suspended sediment. The discharge of large volumes of hydrostatic test waters into surface waters could 1) temporarily cause a change in the water temperature and dissolved oxygen levels, 2) increase downstream flows, and 3) increase stream bank and substrate scour. Energy dissipating devices and dewatering structures would be used to dissipate and remove sediment from hydrostatic test water discharges. Guidelines for water discharge in overland areas and absorption back through the ground would allow water temperatures to reach pre-withdrawal conditions prior to entering streams. No chemicals would be used in hydrostatic test water. The test water would be generally the same quality as the source water because there are no additives to the water. All permits required by federal, state, and local agencies for procurement of water and for the discharge of water used in the hydrostatic testing operation would be acquired prior to hydrostatic testing. Any water withdrawal or discharge would be performed consistent with permit notice requirements and with sufficient notice to make water sample arrangements prior to obtaining or discharging water. Water samples would be taken prior to obtaining water from a water source and before test water is discharged, as required by state and federal permits. National Pollutant Discharge Elimination System (NPDES) permits are required for the discharge of both hydrostatic testing fluids and any water obtained during construction dewatering. Both of these activities can be authorized under an NPDES General Permit for Hydrostatic Testing and an NPDES General Permit for Dewatering. U.S. Environmental Protection Agency Regions 7 and 8 would issue a Section 402, Clean Water Act NPDES permit for the discharge of hydrostatic test water.

The USFWS has adopted a policy that water-related activities in the Platte River basin resulting in less than 0.1 acre-foot per year of depletions in flow to the nearest surface water tributary to the Platte River system do not affect the Platte River target species, and thus do not require consultation with USFWS for potential effects on those species. Similarly, detention basins designed to detain runoff for less than 72 hours and temporary withdrawals of water (e.g., for hydrostatic pipeline testing) that return all the water to the same drainage basin within 30 days' time are considered to have no effect, and do not require consultation. These thresholds were established to minimize the time and effort expended by USFWS, by project proponents, and by lead federal agencies in the review of projects that are not expected, either individually or collectively, to have any appreciable effect on the success or failure of the Platte River species-recovery efforts. One-tenth of 1 acre-foot roughly equates to the annual consumptive use of one residential water user in the Platte River basin.

Additional information on water withdrawal as it relates to special status fish species, including federal threatened, endangered, proposed and candidate species, BLM sensitive species, state threatened and endangered species, and species of conservation concern, is discussed in Sections 3.8 and 4.8, Threatened and Endangered Species and Species of Conservation Concern.

During construction activities, there is also the potential for spills of fuel or other hazardous liquids. Impacts from fuel spills are assessed in Section 4.13, Potential Releases.

Access Roads

The proposed construction of new access roads could cross waterbodies that contain fish species of recreational or commercial significance. Depending on site-specific conditions, bridges or culverts may need to be installed to cross the waterbodies. Construction of these structures would cause an increase in sediment load due to work directly in the waterbody (culvert placement) or disturbance to the banks (bridge installation). Impacts to the aquatic resources from these activities would be similar to those described above for open-cut crossings. Potential impacts to the resources would be short term and minor if similar mitigation measures for open-cut crossings, including implementation of the mitigation measures outlined in the CMRP, are used. Furthermore, all bridge and culvert installations would require specific permits from respective state agencies, with each permit containing specific stipulations to protect aquatic resources. Most access to the proposed Project ROW is along existing roads where waterbody crossings are established. The proposed Project would cause an increase in traffic along existing roads, but impacts from increased traffic would not add to impacts on aquatic resources.

4.7.3.3 Proposed Project Operational Impacts

During operation of the proposed Project, non-forested vegetation would be maintained along the permanent ROW. The reduction of trees in the permanent ROW could result in a permanent loss of shading, nutrients, and habitat enrichment features for fish at some waterbody crossings. Impacts associated with the permanent removal of riparian vegetation would be similar to those described in Section 4.7.3.2, Construction Impacts. A permanent ROW would not be maintained in those areas that would be crossed using the HDD method; therefore, no permanent riparian vegetation impacts are anticipated in these areas. Herbicides would be used to control weeds during proposed Project operation. The use of herbicides near a waterbody could harm aquatic organisms, including fish. Herbicides could enter a waterbody through runoff, seepage through the soil, and direct introduction to water during application through overspray or wind drift. In accordance with the CMRP, no herbicides would be used within 100 feet of a wetland or waterbody, and all herbicide application would be performed by applicators appropriately licensed or certified by the state in which work is conducted.

Restored stream banks could be vulnerable to erosion during the first few years after revegetation and stabilization, potentially leading to sediment entering waterbodies and impacting fisheries habitat. The restoration and revegetation measures presented in the CMRP would be implemented to minimize soil erosion, including in riparian areas.

Routine aerial and ground surveillance inspections would be used to identify areas of erosion, exposed pipeline, and nearby construction activities. These practices would allow for early identification of bank stability problems and would minimize the potential for continuing environmental effects during proposed pipeline operation.

To reduce potential impacts to sensitive aquatic resources as a result of maintenance activities, the appropriate state agency would be consulted prior to initiation of maintenance activities beyond standard inspection measures.

Due to the elevated temperature of the oil in the proposed pipeline, water temperatures at stream crossings could potentially increase. The potential for water temperature increases would be mitigated, but not eliminated, by burying the proposed pipeline at greater depths (60 inches minimum) at stream crossings compared to lesser average pipeline depths across the entire route. Appendix S presents a pipeline temperature effects study. This study focused on the potential effects to soil temperatures as a result of the buried pipeline. The study concluded that the proposed pipeline would increase soil temperature; therefore, it is reasonable to conclude that the proposed pipeline could also elevate stream temperatures. Studies along the Trans-Alaska Pipeline System (TAPS)[2] (BLM 2002) indicate that groundwater temperatures are elevated by the heat from the pipeline, although comparisons of effects between TAPS and the proposed Project are limited in that the TAPS pipeline has different flow rates and is routed through a colder climate.

[2] TAPS is a pipeline that is buried in several river drainages.

The degree of heating would depend upon river discharge. Temperature impacts would likely only occur in streams with very low flows or isolated pools, and would be more likely to occur in spring and fall based on the soil temperature profiles presented in Appendix S, Pipeline Temperature Effects Study. Increases in water temperature can affect fish by decreasing oxygen supply, causing premature movements of juvenile fish, and reduced food supply. Aquatic insects could mature more rapidly and be less available as food for the local fish population outside the immediate vicinity of the crossing.

The burial depth of the proposed pipeline could mitigate these potential temperature impacts. Typical pipeline burial depth is 48 inches; however, Keystone has indicated that burial depth under streams would be a minimum of 60 inches. Additionally, HDD installation would locate the pipeline well below the river bottom, further mitigating potential impacts. If impacts were to occur, they would be expected to be isolated due to the likelihood of few fish in the stream reaches. Larger rivers would not be affected by temperature changes because the volume of water flowing over the proposed pipeline would be great enough to compensate for any increases in the local temperature profile.

4.7.4 Additional Mitigation

No additional mitigation measures for fisheries resource impacts have been required by regulatory agencies to date. However, additional mitigation measures may be identified and required by regulatory agencies during the permitting process.

4.7.5 Connected Actions[3]

4.7.5.1 Bakken Marketlink Project

The Bakken Marketlink Project route would cross one perennial stream (Sandstone Creek), which supports several of the same recreational and commercial fish species identified on Table 3.7-1, including black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), northern pike (*Esox lucius*), and yellow perch (*Perca flavescens*).

The permit applications for the Bakken Marketlink Project would be reviewed and acted on by other agencies. Those agencies would conduct a more detailed environmental review of the Bakken Marketlink Project. If the Bakken Marketlink Project crosses or disturbs aquatic resources, the potential impacts to sensitive fisheries and aquatic habitat would be evaluated during the environmental reviews. Potential fisheries impacts would be evaluated and avoided, minimized, or mitigated as appropriate during state and federal consultation and permitting for the proposed Project. Many of the potential impacts of the Bakken Marketlink Project would be similar to those described above.

[3] Connected actions are those that 1) automatically trigger other actions which may require environmental impact statements, 2) cannot or will not proceed unless other actions are taken previously or simultaneously, 3) are interdependent parts of a larger action and depend on the larger action for their justification.

4.7.5.2 Big Bend to Witten 230-kV Transmission Line

The Big Bend to Witten 230-kV electrical transmission line would cross three perennial streams along the preferred route (Basin Electric Power Cooperative, 2011). Potential impacts to fisheries and aquatic resources would be minimized by spanning them entirely. The proposed Project construction would use a span length between 650 and 950 feet. The largest perennial stream crossed is the White River, which has a maximum waterbody width of 570 feet. In addition, the transmission line would run parallel to and within 100 feet of perennial and intermittent streams for a cumulative distance of 28,000 feet. An adequate buffer between the transmission line corridor and adjacent surface waters would be needed to minimize continued impacts to fisheries and aquatic habitat during initial construction and long-term operation and maintenance activities.

In general, transmission line construction impacts are short term and/or negligible to waterbodies and associated fisheries as well as aquatic habitats because these lines typically span surface waterbodies, many lines would parallel existing roadways or ROWs, and power lines would be installed by local providers under local permitting requirements. Compliance with federal, state, and local agency requirements for water crossings would ensure that activities that are the most feasible and of lowest impact are performed at the site.

4.7.5.3 Electrical Distribution Lines and Substations

Based on a Geographic Information System analysis of the planned locations for electrical lines and substations and intersections with waterbodies identified in the 2012 NHD (U.S. Geological Survey 2012), there would be a total of 217 waterbodies crossed in Montana. Of these, Duck Creek is the only waterbody classified as perennial. Using the same Geographic Information System comparison, there would be a total of 250 waterbodies crossed in South Dakota, of which 16 are perennial.

Proposed construction and operation impacts on waterbodies potentially containing fisheries would be similar to those described for the transmission line discussed above; however, it is likely that the poles would be smaller and that the stringing and staging areas disturbed around the pole installation sites would likely be smaller.

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