RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT

ANHYDROUS AMMONIA RELEASE, KINGMAN COUNTY, KANSAS

June 2009

Prepared for:

Kansas Natural Resource Trustee Council:

U.S. Department of the Interior, Fish and Wildlife Service; and

State of Kansas, Department of Health and Environment

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1. INTRODUCTION

The Kansas Natural Resource Trustee Council, collectively called the "Trustees," prepared this Restoration Plan (RP) and Environmental Assessment (EA) to direct restoration of injured natural resources following a release of anhydrous ammonia from a pipeline owned by Magellan Ammonia Pipeline, L.P. (Magellan) in Kingman County, Kansas. The Trustees include the U.S. Fish and Wildlife Service (USFWS) representing the U.S. Department of the Interior (DOI) and the Kansas Department of Health and Environment (KDHE) representing the State of Kansas. Through a consent decree in November 2008, the Trustees settled a natural resource damages claim with Magellan. The Trustees sought this settlement as compensation for injured natural resources resulting from the release of anhydrous ammonia.

The Trustees are required to use recovered natural resource damages to "…restore, rehabilitate, replace, and/or acquire the equivalent of the injured natural resources and their associated services." This document describes the Trustees' plans relating to expending the received damages for restoration, identifies the types of restoration projects that the Trustees propose to undertake, explains the Trustees' rationale for the selection and prioritization of restoration alternatives, and serves as an EA as required under the National Environmental Policy Act (NEPA) of 1969.

2. PURPOSE, NEED, AND BACKGROUND

2.1 PURPOSE AND NEED FOR RESTORATION

The purpose of the proposed RP and EA is to restore, replace, or acquire the equivalent of natural resources injured from an anhydrous ammonia pipeline failure. The underlying need for the action is to ensure recovery and adequate compensation to the public following injuries to natural resources from the pipeline release. The primary natural resource injuries are associated with the physical impairment and direct mortality of aquatic organisms in stream habitats and the likely direct mortality of migratory birds and physical impairment of their riparian habitat.

2.2 CERCLA AND NATURAL RESOURCE DAMAGE ASSESSMENT (NRD)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at 43 Code of Federal Regulations (CFR) Part II authorizes designated Trustees of natural resources the authority to represent the public to recover damages for injuries to natural resources and to restore, rehabilitate, replace, or acquire the equivalent of the injured natural resources and their associated services. Under Section 107(F) of CERCLA and Section 311 of the Federal Water Pollution Control Act at 33 United States Code (USC) §1251 *et seq.* – more commonly known as the Clean Water Act (CWA) – and other applicable Federal and State laws – including subpart G of the National Contingency Plan (NCP) 40 CFR §§ 300.606-300.615 – the State of Kansas and DOI are the Trustees for the natural resources in Kansas. Natural resources include surface waters, ground water, soils, air, plants, and

wildlife. As Trustees, the State of Kansas and DOI serve as stewards for these resources and have the authority to assess potential contaminant-related injuries to them.

The Trustees use the natural resource damage assessment and restoration (NRD) process to evaluate injuries associated with the release of hazardous substances and select appropriate compensation for those injuries. NRD complements response actions by providing a means to restore injured natural resources to the condition they would have been in but for unpermitted contaminant releases and to compensate the public for interim lost services provided by those resources.

2.3 NATURAL ENVIRONMENTAL PROTECTION ACT (NEPA) OF 1969

This restoration plan and environmental assessment has been prepared in accordance with NEPA at 42 U.S.C. §§4371 *et seq.* as amended, its implementing regulations at 40 CFR §§1500 *et seq.*, and the Department of the Interior's Department Manual, Part 516. As such, the Trustees have concluded that this plan meets the categorical exclusion requirements of NEPA under 516 DM 8.5 B (11) because only minor or negligible change as a result of implementing this restoration plan is planned. However, the Trustees wish to provide additional details to the public about the plan's environmental effects. The Trustees will issue a finding of no significant impact with the final version of this document.

2.4 OTHER AUTHORITIES

As described below, the Trustees have taken or will take specific steps to comply with applicable laws, executive orders, and policies.

Clean Air Act of 1970, as amended. The Trustees do not anticipate emissions to be generated from the implementation of any project alternative and thus would not fall under regulation and accordingly would already be in compliance with the State of Kansas ambient air quality standards.
Clean Water Act of 1972, as amended. The Trustees do not anticipate the need for a CWA permit at this time.

Endangered Species Act of 1973, as amended. This act requires federal agencies to determine whether their actions may adversely affect any federally-listed or proposed threatened or endangered species. If so, formal consultation pursuant to Section 7 of the Endangered Species Act (ESA) must be initiated with the U.S. Fish and Wildlife Service. As part of the public review and comment process, the Trustees will provide a copy of the draft RP and EA to the USFWS's Field Office in Manhattan, Kansas.

Farmland Protection and Policy Act of 1981. This act aims to protect farmland and reduce urban sprawl. No activities proposed under this RP and EA increase urban sprawl. Although some activities proposed in this document may remove lands

from agricultural use, these areas will be preserved and returned to a more native and natural state.

Information Quality Act of 2001. The information presented in this RP and EA meets the requirements of the IQA, including quality, utility, objectivity, and integrity.

Migratory Bird Treaty Act of 1918, as amended. No actions proposed in this RP and EA will result in the taking of migratory bird species. Restoration actions are intended to provide improve quantity and quality of habitat.

National Historic Preservation Act of 1966, as amended. The Trustees will provide the State of Kansas Historic Preservation Officer with the draft RP and EA as part of the public review and comment process, requesting their input to ensure project compliance with Section 106 of the National Historic Preservation Act. There are no local tribes with whom to consult on the issues of threatened or sensitive tribal sites, or traditional heritage properties.

National Wildlife Refuge System Administration Act of 1966, as amended. No national wildlife refuges are present in Kingman County. The project alternatives in this RP and EA will not have any significant adverse effects on refuges outside of the county.

Executive Order 11988, *Floodplain Management.* Executive Order 11988 directs all federal agencies to take action to avoid, to the extent possible, the long- and short-term effects associated with the occupancy and modification of floodplains. The project alternatives in this RP and EA will not have any significant adverse effects associated with modification and occupancy of floodplains.

Executive Order 11990, *Protection of Wetlands*. Implementation of any project alternative in this RP and EA is not anticipated to have or cause any significant adverse effects on wetlands.

Executive Order 12898, *Environmental Justice*. Implementation of any project alternative in this RP and EA is not anticipated to cause disproportionate adverse human health or environmental effects to minority or low-income populations.

Executive Order 12962, *Aquatic Systems and Recreational Fisheries.* Executive Order 12962 directs federal agencies to add additional public access to fisheries nationwide by conserving, restoring, and enhancing aquatic systems. Implementation of project alternatives in this RP and EA will be designed to maximize long-term benefits to aquatic systems.

Executive Order 13007, *American Indian Sacred Sites*. Executive Order 13007 directs federal agencies to accommodate access to and ceremonial use of American Indian sacred sites by Indian religious practitioners and to avoid adversely affecting

the physical integrity of such sites. Implementation of any project alternative in this RP and EA is not expected to affect access or ceremonial use of American Indian sacred sites.

Executive Order 13045, *Protection of Children*. Implementation of any project alternative in this RP and EA is not anticipated to cause disproportionate environmental health or safety effects to children.

Executive Order 13112, *Invasive Species*. Implementation of any alternative in this RP and EA will use existing integrated pest management strategies to prevent the introduction of invasive species, such as noxious weeds, and will not authorize or carry out actions that are likely to introduce or spread invasive species.

Executive Order 13186, *Protection of Migratory Birds*. Implementation of any alternative in this RP and EA is not anticipated to cause measurable negative effects on migratory bird populations.

DOI Departmental Manual, Parts 517 and 609, *Pesticides and Weed Control*. Consistent with DOI policy, implementation of any alternative in this RP and EA will use integrated pest management strategies. Pesticides will be used only after a full consideration of alternatives, and if used, the least hazardous material that will meet restoration objectives will be chosen.

DOI Departmental Manual, Part 518, Waste Management. Implementation of any alternative in this RP and EA is not expected to generate hazardous wastes.

DOI Departmental Manual Part 602: Land Acquisition, Exchange, and Disposal. The federal government will not acquire real property thus appropriate pre-acquisition standards – particularly the American Society for Testing and Materials standards on Environmental Site Assessments for Commercial Real Estate in effect at the time – do not apply to selected alternatives involving property acquisition.

341 FW 3. Pre-Acquisition Environmental Site Assessments. All conditions set forth in FW3, including environmental site assessment requirements, including pre- and post-acquisition requirements, Level I, II, or III assessment, assessment standards and conditions, retention of records, and time limits are not applicable because the federal government will not acquire real property.

2.5 PUBLIC PARTICIPATION

Public participation is required by NEPA at 40 CFR §1506.6 and is a very important part of restoration plan development. As described previously, the proposed actions in this RP and EA are categorically excluded from the NEPA process that includes public notification. However, as formerly noted the Trustees desire public involvement in developing the RP and EA and thus are making this document

available for public input. Comments and input regarding this RP and EA are encouraged and will be accepted during a period of thirty days after the release of this RP and EA. Comments should be submitted to:

Leo G. Henning
Kansas Department of Health and Environment
1000 SW Jackson, Suite 430
Topeka, KS 66612

When available, further information about this RP and EA and a final document will be posted to the following website: http://www.fws.gov/mountain-prairie/NRDA/

2.6 ANHYDROUS AMMONIA RELEASE

On October 27, 2004, a portion of pipeline, owned by Magellan, ruptured releasing an estimated 4,858 barrels or 204,000 gallons of anhydrous ammonia in the South Half of the Southwest Quarter of Section 21, Township 27 South, Range 6 West, Kingman County, Kansas. Ammonia entered an unnamed tributary to Smoots Creek and was carried into Smoots Creek and an unknown length of the South Fork Ninnescah River.

The ammonia raised the water's pH causing a widespread kill of aquatic organisms including fish and macroinvertebrates in approximately 13 miles of a Smoots Creek tributary and Smoots Creek to its confluence with the South Fork Ninnescah River. Results of KDHE and Kansas Department of Wildlife and Parks (KDWP) fish kill investigations recorded about 21,000 dead fish specimens comprising 32 species, including the Arkansas darter which is a listed species in Kansas. The resultant aquatic kill comprises an aquatic surface water injury under CERCLA and the CWA as described in section 2.2.

2.7 CONTAMINANT OF CONCERN

Anhydrous ammonia is designated as a "hazardous substance" under CERCLA at 42 USC 9601 and an imminently hazardous chemical substance pursuant to section 7 of the Toxic Substances Control Act at 15 USC 2606. Anhydrous ammonia is classified at 49 CFR 195 as a highly volatile liquid and is transported as a liquefied gas in pipelines. When exposed to the atmosphere ammonia will rapidly expand immediately returning to a gaseous state. Anhydrous ammonia reacts with moisture in the atmosphere and can produce a fog-like vapor cloud. Anhydrous ammonia is readily soluble in water. The unionized form of ammonia (NH_3) in water is highly toxic to fish and other aquatic life.

3. AFFECTED ENVIRONMENT

3.1 NATURAL RESOURCES

The unnamed tributary is an intermittent stream and joins Smoots Creek approximately one-half mile downstream from the release site. Smoots Creek is a perennial stream and one of the main tributaries to the South Fork Ninnescah River. Smoots Creek generally flows from northwest to southeast in northeastern Kingman County and joins the South Fork near the center of the eastern border of the county. The South Fork is a perennial stream that generally flows eastward across the northern third of the county and drains nearly all the northern half of the county.

The Kansas Department of Wildlife and Parks (KDWP) documented[1] forty-one species of fish occurring in Smoots Creek during surveys made from 1996 to present. Kansas recognizes Smoots Creek's and the South Fork Ninnescah River's importance as natural resources. KDHE (2004) classified both streams as special aquatic life use waters.

In its fish kill investigation KDWP estimated fish mortality at 21,448 specimens. Due to safety regulations survey crews were unable to access the affected portion of Smoots Creek until six days after the release occurred and ammonia entered the stream system. This delay might have resulted in the survey crews underestimating total mortality as a result of specimens being scavenged, sinking to the steam bottom and not being observed, and washing downstream out of the known affected stream reach. A follow-up biological investigation by KDHE showed certain groups of macroinvertebrate populations including caddisflies, mayflies, and stoneflies were reduced by as much as half in stream habitat downstream of where ammonia entered Smoots Creek.

Smoots Creek and the South Fork provide habitat for fish listed as threatened or endangered in Kansas. KDWP has designated Smoots Creek as critical habitat for the Arkansas darter (*Etheostoma cragini*), which is listed as a threatened species in Kansas (KDWP 2004) and a candidate species for federal listing (USDOI). The South Fork Ninnescah River is designated by KDWP as critical habitat for the Arkansas darter; Arkansas River shiner (*Notropis girardi*), Kansas (endangered), federal (threatened); Arkansas River speckled chub (*Macrhybopsis tetranema*), Kansas (endangered); and silver chub (*Macrhybopsis storeriana*), Kansas (endangered) KDWP (2004). Though it is not designated as critical habitat, KDWP personnel collected a single silver chub specimen near the mouth of Smoots Creek during its fish kill investigation as well as confirming mortality of the Arkansas darter in Smoots Creek.

The riparian areas along Smoots Creek provide habitat for migratory birds. The Kansas bird checklist for Kingman County lists 277 species in which there are 10 or more records and 68 breeding records. The vapor cloud produced by the ammonia

[1]Mark VanScoyoc, KDWP, e-mail message to Trustees, April 7, 2009.

release was approximately one-half mile wide and traveled down the riparian corridor along the tributary roughly one and one-half miles to its confluence with Smoots Creek.

3.2 CULTURAL ENVIRONMENT AND HUMAN USE

DEMOGRAPHICS

The estimated population of Kingman County as of 2007 is 7,826 (USCB undated). This represents a decrease of 9.8 percent since the last decennial census in 2000 (USCB undated). The main population center in the county is the City of Kingman (pop. 3,056) which is about 8 miles west from the release point (USCB undated). The city's population decreased similarly to the county's at 9.0 percent since the last census. Exhibit 1 summarizes age and race information for the county and for the State of Kansas.

EXHIBIT 1. Kingman County 2007 Demographics

CATEGORY	COUNTY	KANSAS
AGE		
Persons under 5 years old, percent, 2007	4.6%	7.1%
Persons under 18 years old, percent, 2007	22.2%	25.1%
Persons 65 years old and over, percent, 2007	20.2%	13.0%
RACE		
White persons, percent, 2007 (a)	96.9%	88.9%
Black persons, percent, 2007 (a)	0.3%	6.1%
American Indian and Alaska Native persons, percent, 2007 (a)	0.8%	1.0%
Asian persons, percent, 2007 (a)	0.3%	2.2%
Native Hawaiian and Other Pacific Islander, percent, 2007 (a)	0.2%	0.1%
Persons reporting two or more races, percent, 2007	1.4%	1.8%
Persons of Hispanic or Latino origin, percent, 2007 (b)	2.1%	8.8%

Source: USCB undated.

(a) Includes persons reporting only one race.

(b) Hispanics may be of any race, so also are included in applicable race categories.

EMPLOYMENT AND INCOME

Approximately 4,088 individuals comprise Kingman County's labor force (USCB 2000). As of October 2008, the county-wide unemployment rate was 3.5 percent (USBL 2008a).

Employed civilians work in a variety of industries including: construction (7.8 percent), retail trade (14.6 percent), educational and health services (15.8 percent), and manufacturing (16.0 percent). About 16.5 percent of the employed civilian population in Kingman County works in the agriculture, forestry, and fisheries group of industries (USCB 1990).

Kingman County's median household income for the county, reported as $44,859 in 2007, was lower than the state median of $47,341 (USCB undated). That same year, the county's population below the poverty level (10.8 percent) was slightly below

the state level of 11.2 percent (USCB undated). The 2000 report of Kingman County's homeownership rate was above that of Kansas (77.8 versus 69.2 percent); however, the median value of owner-occupied housing units in the county was well below that of the state value of $56,800 versus $83,500 (USCB undated).

LAND USE

Kingman County is principally agricultural. The 2007 Census of Agriculture reported 876 farms in the county, up 5.0 percent from the 2002 Census, totaling approximately 546,231 acres (NASS 2007). By acreage, the main crops are wheat, soybeans, sorghum, and corn (NASS 2007). The acreage of land used for forage ranks second only to wheat (NASS 2007).

ECONOMIC ACTIVITY

Agricultural production in the county includes both crops and livestock. In 2007, crop sales accounted for $25,749,000 or about 49 percent or total sales, and livestock sales accounted for the remaining 51 percent or $26,302,000 of total sales (NASS 2007). The commodity groups comprised of grains, oilseeds, dry beans, and dry peas and milk and other dairy products from cows account for most (over 92 percent) of commodity sales (NASS 2007). Cattle and calves were the largest livestock inventory item both in number and in value terms. The remaining livestock inventory items high in number were the sheep and lambs, hogs and pigs, and horses and ponies, though they were significantly lower in value (NASS 2007).

RECREATIONAL AND CULTURAL RESOURCES

A small portion of Cheney Reservoir extends into the extreme northeastern corner of Kingman County. This 9,537-acre reservoir includes a 5,249-acre wildlife area and a 1,913-acre state park (KDWP 2005). Recreational opportunities include boating, fishing, camping, hunting, shooting, and other recreational activities (KDWP 2005). Kingman State Fishing Lake is roughly seven miles west of the City of Kingman. Encompassing Kingman State Lake is the 4,622-acre Byron Walker Wildlife Area (KDWP 2008). The wildlife area also encompasses portions of the South Fork Ninnescah River. Recreational opportunities include archery, bird watching, camping, fishing, hiking, and hunting (KDWP 2008).

The Kansas State Historical Society maintains records of historic and archaeologically important sites in Kansas. Seven buildings are listed on the National Register of Historic Places and one on the Register of Historic Kansas Places within or very near the Kingman city limits (KSHS undated). The Prather Barn, located at NW 30th Street and NW 60th Avenue, is the only building of any significant distance from the Kingman city limits (KSHS undated). Other than historic buildings the search of the National and State Register Database did not disclose any sites of historical import such as known key archaeological sites.

4. RESTORATION ALTERNATIVES

The Trustees believe the anhydrous ammonia release injured natural resources. In their uninjured state, these natural resources provide a variety of "services," both to people and other natural resources. Services provided to the environment are called "ecological services." For example, uninjured surface water can provide habitat services – *i.e.*, a place to live – for certain threatened and endangered species as well as other aquatic organisms. Surface water also provides foraging opportunities, another kind of ecological service, for animals that eat fish, invertebrates, and other aquatic organisms.

The Trustees identified several potential restoration alternatives. The Trustees selected the alternatives discussed in this Restoration Plan and Environmental Assessment to compensate for the lost natural resources as a result of the ammonia release. The ammonia release killed all age classes of fish and significantly diminished the aquatic invertebrate populations for miles of Smoots Creek. The Trustees focused restoration alternatives on aquatic restocking efforts and natural recovery of aquatic organism populations by preserving existing stream habitat either through conserving riparian corridor only or a combination of riparian corridor and adjoining upland habitats.

This plan identifies real property where alternatives will be applied. As part of compensatory restoration for the Trustees' NRD claim, Magellan transferred 157 acres of property to Wichita State University. The property includes riparian corridor along a reach of Smoots Creek and adjoining upland prairie habitat. Alternatives are independent; *e.g.*, aquatic restocking could be done without preservation of existing habitat because the aquatic injury discussed in this plan resulted from the ammonia release and not the condition of existing stream and riparian habitat.

The alternative of preserving existing stream habitat will be considered as a terrestrial alternative because it would be accomplished via conserving riparian corridor. The evaluation of alternatives begins with the "no action," and the order of alternatives is not intended to reflect the Trustees' preferences.

4.1 ALTERNATIVE 1: NO ACTION

Under this alternative, the Trustees would rely solely on natural recovery and would take no direct action to restore injured natural resources (*i.e.*, aquatic restocking) or compensate for interim lost natural resource services. Under this alternative, natural resources lost resulting from the release and interim losses would not be compensated. This alternative would include the last year of a multi-year biological monitoring program by KDWP to assess the aquatic communities of Smoots Creek but would not include additional activities aimed at enhancing ecosystem biota or processes or preserving stream habitat.

4.2 ALTERNATIVE 2: COMPLETE AQUATIC RESTOCKING

This alternative aims to restock all the fish species documented in the fish kill investigations of Smoots Creek. The Trustees would obtain fish from a number of

sources depending on availability. Sport fish, such as the channel catfish, could be purchased. The stocking of sport fish would chiefly be used to replace catchable-sized channel catfish lost from the Fishing Impoundments and Stream Habitats (F.I.S.H.)[2] area near the mouth of Smoots Creek. Some native fish could be acquired[3] from the J.W. Mumma Native Aquatic Species Restoration Facility (NASRF) in eastern Colorado. This facility specializes in producing native fishes including many that are native to Kansas. The Trustees also would use translocation of fish from native populations and introduce them into the injured length of Smoots Creek for those species not available through purchase or through the NASRF.

4.3 ALTERNATIVE 3: LIMITED AQUATIC RESTOCKING

This alternative aims only to restock a specific species of sport fish, specifically the channel catfish, as KDWP documented catchable-sized specimens during its fish kill investigation of Smoots Creek. The Trustees would purchase channel catfish and release them in the F.I.S.H. area. As previously mentioned, the stocking of sport fish would chiefly be used to replace catchable-sized channel catfish lost from the F.I.S.H. area located at the mouth of Smoots Creek.

4.4 ALTERNATIVE 4: PRESERVATION OF STREAM HABITAT VIA RIPARIAN CORRIDOR

This alternative aims to preserve riparian corridor thereby enhancing and protecting stream habitat. Riparian corridors are an integral part of the ecosystem health of surface waters. Healthy riparian corridors contribute to overall water quality and ensure the health of the aquatic ecosystem. Riparian corridors reduce runoff from exposed soils and impermeable surfaces and stabilize existing near-stream areas that have easily erodible soils that can degrade stream quality. The Trustees anticipate that protection of riparian corridors will help promote the natural recovery of aquatic organisms including federally and state-listed species as well as other fish and aquatic life.

Under this alternative the Trustees have prioritized riparian parcels along the injured portion of Smoots Creek. Assuming a six hundred feet total corridor width, the length of corridor required for compensatory restoration is in the order of two miles. Any area to be preserved would either be purchased (preferred) or an easement would be purchased and placed on it to protect the area in perpetuity. Management would target the native vegetation condition whether woody, herbaceous, or any combination thereof. Trees not native to the area and undesirable trees and other invasive vegetation would be removed by any number of means including mechanical and chemical.

[2]F.I.S.H. is a program administered by KDWP to lease private waters from landowners for public fishing.
[3]Jim Hays, KDWP, e-mail message to Trustees, May 9, 2007.

4.5 ALTERNATIVE 5: PRESERVATION OF STREAM HABITAT VIA RIPARIAN CORRIDOR AND NATIVE PRAIRIE

Similar to Alternative 4, this alternative aims to preserve riparian corridor thereby protecting stream habitat. Additionally, this alternative would preserve native prairie habitat adjacent to the riparian corridor. Like a healthy riparian corridor, a healthy prairie habitat would contribute to overall water quality and protect the health of the aquatic ecosystem by creating additional buffer for the riparian corridor. The Trustees anticipate that through protection of upland prairie habitat the riparian corridors will benefit and thus promote the recovery of aquatic organisms including federally and state-listed species as well as other fish and aquatic life from the effects of the ammonia release.

Under this alternative the Trustees have prioritized riparian parcels and adjoining native prairie along the injured portion of Smoots Creek. Because a portion of the required compensatory restoration would consist of native prairie, the length of riparian corridor obtained could be less than necessary in Alternative 4. Any area to be preserved would either be purchased (preferred) or an easement would be purchased and placed on it to protect the area in perpetuity. Management of the riparian corridor would be the same as that described in Alternative 4. Management of native prairie would seek to optimize the diversity of native prairie species through prescribed burning, mowing, haying, etc. Likewise, undesirable trees and other vegetation in the native prairie habitat would be removed by any number of means including mechanical and chemical.

4.6 ALTERNATIVE 6: PRESERVATION OF NATIVE PRAIRIE

This alternative aims to preserve only native prairie habitat without interest to its association with riparian corridor along Smoots Creek. Native prairie that coincides with riparian corridor would provide benefits to the aquatic ecosystem as described in Alternative 5. Native prairie habitat not coincidental with riparian corridor but within the Smoots Creek watershed would help contribute to the overall health of the aquatic ecosystem and have a beneficial effect on parts of the drainage basin.

Under this alternative the Trustees have prioritized native prairie parcels with priority given to those prairies of the highest vegetative quality. Any area to be preserved would either be purchased (preferred) or an easement would be purchased and placed on it to protect the area in perpetuity. Prairie quality can be determined using the floristic quality index; a measure developed by the Kansas Biological Survey to evaluate the quality of vegetative communities in Kansas. Management of native prairie would be the same as that described in Alternative 5.

5. EVALUATION AND ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

The evaluation of alternatives requires certain considerations. As required under 43 CFR §11.82(c) the Trustees considered the following factors in the evaluation of the alternatives:

1) The degree to which the project would provide the public with ecological services similar to those lost as a consequence of the ammonia release;
2) Technical feasibility;
3) The probability of project success;
4) The anticipated relationship of costs to benefits;
5) The relative cost-effectiveness of different alternatives;
6) The ability of the natural resources to recover with or without each alternative, and the time required for such recovery;
7) The potential for collateral injury to the environment if the alternative is implemented;
8) Potential effects on public health and safety;
9) The results of actual or currently-planned response actions;
10) Compliance with applicable federal and state laws; and
11) Consistency with relevant federal and state policies.

The most applicable alternatives are those that provide ecological services similar to those lost; are technically feasible with a high probability of success; are cost-effective; are unlikely to collaterally injure natural resources; pose little, if any, risk to public health; and comply with applicable laws and policies.

Cost estimates are approximations based on information available at the time the Trustees estimated damages. Costs, such as real estate, are expected to vary over time and with the size and scope of the alternatives. As a result, today's prices might not reflect those at the time damages were estimated and will reflect the total scope of the compensatory restoration alternatives. Government agencies are required to pay fair market value for lands purchased. Fair market value is measured through established appraisal procedures. The cost information developed in this report is intended to be of sufficient detail and reliability for purposes of general prioritization of restoration alternatives. Many assessment components are based on the supposition that the Trustees will be doing the land purchasing and thus would need funds for the actual land purchase, the purchase process, and all other applicable components the Trustees dub primary and auxiliary costs. If a potentially responsible party carries out the land purchase and purchase process, then that could significantly reduce costs.
Following is an evaluation of alternatives including consideration of the previously listed factors. Results are categorized as "benefits," "risks," and "costs" for each alternative.

5.1 ALTERNATIVE 1: NO ACTION

Benefits

This alternative essentially represents natural recovery. The Trustees anticipate natural recovery would occur and projected that achievement of natural recovery would take at least five years. Natural recovery would account for service loss assuming that the fish population in the affected length of Smoots Creek achieved at least pre-release quantities.

Risks

This alternative would not compensate for the interim natural resource loss incurred during the natural recovery period. Thus, this alternative would not fully compensate for the lost natural resources. Because no action would occur, there would not be any likelihood of affecting other natural resources.

Costs

This alternative would not require monetary dispensation as no costs would be incurred. Those costs described in Alternative 4.1 for biological monitoring would have been incurred regardless of whether any claim was pursued thus is not considered a cost as part of this alternative.

5.2 ALTERNATIVE 2: COMPLETE AQUATIC RESTOCKING

Benefits

Stocking all the fish species in sufficient numbers to make up for lost progeny would compensate for past loss of this group of aquatic fauna and would essentially constitute immediate resource compensation of this group of aquatic fauna affected by the release provided that fish are available for purchase from producers, through the NASRF, and by translocation of fish from native populations. Thus, interim loss for this group of fauna would be negligible presuming that abrupt stocking of all species affected would occur and thus preclude the lag period necessary for natural recovery. Another benefit is the enhancement of recreational values of Smoots Creek.

Risks

Some risks of complete aquatic restocking exist. Logistically, if fish are not immediately available, then any delay in restocking efforts would result in interim loss. Finding appropriate sites and the uncertainty about the availability of staff and the amount time to complete the translocation also complicate the logistics of this alternative and further increase the potential for incurring interim loss. Also, those translocation sites where fish are captured for release into Smoots Creek would at least temporarily incur a population decline. If one of the sites occurred in a source area for a species, such as the Arkansas darter, it could have lasting effects on the populations of darters that rely on the source population. There is inherent risk in the

restocking effort itself because the probability of success varies, and as a result, could inadequately compensate past loss and thereby resulting in interim loss of aquatic resources. Furthermore, stocking fish from various sources outside of the Smoots Creek drainage introduces the potential for bringing in disease or aquatic nuisance species. Thus, the technical feasibility of this alternative could make implementing it more difficult.

Costs

The Trustees received a cost estimate of $50 per inch of fish as the delivered cost for native species produced at the NASRF. Most of the fish that the Trustees presume could be produced by the NASRF consist of nine native species comprising 11,063 specimens generally ranging in size from one to four inches in length. Replacing just the same number of one-inch specimens would cost $553,150. This does not adjust for mortality rates or the size variability that would increase the previous figure. Trustees estimated the cost of restocking each sport fish species at approximately $25,000, and the replaceable sport fish includes nine species. Thus, replacing sport fish could total as much as $250,000. Translocation costs would consist of staff time and transport equipment including vehicles needed to keep fish alive and release them at designated release sites on Smoots Creek. The Trustees project the translocation rate as approximately $3,000 per site for staff time and $500 per site for transport equipment. The Trustees anticipate collecting fish at twenty sites over two years for a total of about $140,000. Accordingly, the total minimum for this alternative would be $718,150.

5.3 ALTERNATIVE 3: LIMITED AQUATIC RESTOCKING

Benefits

The benefits of this alternative include restocking that would compensate for past loss of one group of sport fish, specifically the channel catfish. This would essentially constitute immediate resource compensation of this group of aquatic fauna provided that fish are available. Thus, interim loss for this specific group of fauna would be negligible presuming that abrupt stocking would occur and thus preclude the need for a lag period of natural recovery.

Risks

Under this alternative, loss of fish resources would only be partially compensated and thus some interim loss would occur as not all species would be restocked, and consequently only partial complete immediate resource compensation would occur. Logistically, if fish are not immediately available, then any delay in restocking efforts would result in additional interim loss of this aquatic resource. There is a slight risk in the restocking effort itself; however, because the stocked fish will be of catchable size the probability of survival of is projected to be very high. In addition, stocking fish from sources outside of the Smoots Creek drainage introduces the potential for bringing in disease or aquatic nuisance species.

Costs

The Trustees estimated $25,000 as the costs of stocking catchable-sized catfish. This is based on the delivered cost over five years.

5.4 ALTERNATIVE 4: PRESERVATION OF STREAM HABITAT VIA RIPARIAN CORRIDOR

Benefits

The benefits of purchasing riparian corridor or easements to preserve stream habitat include the maintenance of the protective buffering functions provided by these areas to surface waters. Preservation will also ensure the availability of this ecologically valuable habitat for native flora and fauna. Riparian habitat serves to capture and filter terrestrial runoff before it enters streams. Riparian habitat serves as habitat for both resident and migratory birds. Protection of riparian corridors will support a healthy aquatic ecosystem thereby promoting the recovery of aquatic and terrestrial organisms including federally and state-listed species. This would provide for natural recovery to compensate the public for past and interim losses to the aquatic resources.

Risks

The main risk of purchasing riparian corridor or easements is the logistical aspect of finding willing landowners to sell or ease only riparian corridor. It is the Trustees experience that landowners are not generally willing to sell or ease a relatively narrow corridor. Rather, landowners seem more inclined to sell or ease corridor with some other type of adjoining habitat thereby constituting a complete parcel of property coinciding with the boundaries of the Cadastral Survey. Also, the stream within the corridor is a valuable commodity both in terms of potential use and adding to property values. Because riparian corridors – especially along smaller streams – are generally narrow, the corridor in most cases must be longer to achieve the estimated acres required for compensatory restoration. Right of entry is another issue as the only access points might be through private property if the corridor is not abutting a public right-of-way. This might create the need to seek additional legal agreements with other landowners not involved in the original purchases or easements. These logistical issues are not insurmountable but do potentially complicate the riparian corridor acquisition processes and its long-term management. The probability that this habitat cannot be successfully maintained in its current state is low. Additionally, the risks for adverse collateral effects of this alternative are low.

Costs

Valuing this alternative assumes limited restoration activities might be required on portions of the acquired or eased riparian corridor hence the cost estimate includes a relatively low restoration cost per acre. Restoration on the riparian corridor would seek to capitalize on benefiting and promoting stable populations of fish, especially the Arkansas darter. As previously stated, assessments are grouped into two

categories the Trustees call principal and auxiliary costs. The estimated principal costs for this option include funds for: (a) purchasing land or easements, (b) restoration, (c) long-term operation and maintenance, (d) the land acquisition process, and (e) fencing; and the estimated auxiliary costs include funds for: (f) NRD documents (management plan, restoration plan, and environmental assessment), (g) floristic quality baseline assessment, and (h) Trustee oversight.
The expected per acre cost for riparian corridor is $2,000 per acre. Riparian acreage tends to be higher in price than other types of habitat acreage such as prairie. The limit the Trustees would spend per acre for an easement is half the purchase cost or $1,000. Restoration costs are $250 per acre, and long-term operation and maintenance is $800 per acre. The land acquisition process is a lump sum of $30,000. The final principal expense is fencing at $1.50 per linear foot.

The first auxiliary cost is a lump sum of $15,000 for NRD document preparation. The floristic quality baseline assessment is $8,000 per parcel evaluated where the maximum size of a parcel is effectively 40 acres. The last auxiliary cost is a lump sum of $35,000 for the Trustee's oversight and administration of the claim.

As previously mentioned, cost components can vary over time and scope of the proposal. Given that, the overall total is $3,926 per acre for this alternative based on one hundred forty-five acres required for compensatory restoration by preserving stream habitat by means of riparian corridor.

5.5 ALTERNATIVE 5: PRESERVATION OF STREAM HABITAT VIA RIPARIAN CORRIDOR AND NATIVE PRAIRIE

Benefits

The benefits to this alternative are similar to those for Alternative 4, *i.e.*, the maintenance of the protective buffering functions to surface waters and habitat provided by riparian corridor. Additionally, prairie habitat next to riparian corridors would further reduce runoff by creating additional buffer for the riparian corridor. Healthy prairie habitat accompanying riparian corridor would also contribute to overall water quality and ensure the health of the aquatic ecosystem. Preservation will also ensure the availability of this ecologically valuable habitat and a new suite of habitat, specifically native prairie, for native flora and fauna including grassland-nesting, migratory birds. Protection of prairie habitat bordering riparian corridors will benefit the riparian corridors and thus promote the recovery of aquatic and terrestrial organisms including federally and state-listed species. This would make available the habitat required for recovery to compensate the public for past and interim losses to natural resources.

Risks

The risks of this alternative are much reduced when compared to the risks in Alternative 4. The main risk of purchasing parcels of riparian corridor and native prairie or easements on these parcels is the logistical aspect of finding parcels

containing both habitats within the Smoots Creek watershed. The risks for adverse collateral effects of this alternative are low.

Costs

Appraisal of this alternative assumes limited restoration activities might be required on portions of the acquired or eased riparian corridor and native prairie hence the cost estimate includes a relatively low restoration cost per acre. Similar to Alternative 4, restoration on the riparian corridor would seek to capitalize on the benefits of promoting stable populations of fish, especially the Arkansas darter. Additionally, restoration of prairie habitat next to riparian corridors would aim to promote maximum biological diversity and further reduce runoff by maintaining additional buffer for the riparian corridor. Like the costs in Alternative 4, assessments are grouped into two categories of principal and auxiliary costs.

The expected per acre cost for a parcel consisting of riparian corridor and native prairie is $1,500 per acre. Prairie acreage tends to be lower in price than other types of habitat acreage such as riparian corridor. The limit the Trustees would spend is $750 per acre for an easement or half the projected purchase cost. The remaining principal costs are comparable to those in Alternative 4. Restoration costs are $250 per acre, and long-term operation and maintenance is $800 per acre. The land acquisition process is a lump sum of $30,000. Fencing is $1.50 per foot.

The auxiliary costs are the same as those in Alternative 4. NRD document preparation is $15,000. The floristic quality baseline assessment is $8,000 per parcel based on a 40-acre parcel size. Trustee oversight and administration of the claim is $35,000.

As previously mentioned, cost components can vary over time and scope of the proposal. Given that, the overall total is $3,426 per acre for this alternative based on one hundred forty-five acres required for compensatory restoration by preserving stream habitat by means of riparian corridor and adjacent prairie habitat.

5.6 ALTERNATIVE 6: PRESERVATION OF NATIVE PRAIRIE

Benefits

The benefits to purchasing native prairie include the buffering functions of this habitat by further reducing runoff by creating additional buffer for the riparian corridor. This also contributes to overall water quality and ensures the health of the aquatic ecosystem. Preservation will also ensure the availability of this new habitat type for native flora and fauna including migratory birds. Protection of prairie habitat bordering riparian corridors will benefit the riparian corridors and thus promote the recovery of aquatic organisms including federally and state-listed species.

Risks

The risks of this alternative are much reduced when compared to Alternative 4 and slightly less reduced compared to the risks in Alternative 5. In the Trustees' experience, finding parcels of solely native prairie or purchasing easements on these parcels is much more practicable than Alternative 4 and slightly easier than Alternative 5. The main risk is again the likelihood of finding parcels containing this habitat within the Smoots Creek watershed. Furthermore, the risks for adverse collateral environmental effects of this alternative are low.

Costs

Similar to Alternatives 4 and 5 the appraisal for this alternative assumes limited restoration activities might be required on portions of the acquired or eased prairie and accordingly the cost estimate includes a relatively low restoration cost per acre. Restoration of prairie habitat would aim to promote maximum biological diversity and further reduce runoff by maintaining additional buffer for the Smoots Creek watershed. Corresponding with the costs in Alternatives 4 and 5, assessments are grouped into two categories of principal and auxiliary costs.

The principal and auxiliary costs are expected to be equal to those in Alternative 5. The projected per acre cost for a parcel consisting of native prairie is $1,500 per acre as prairie acreage tends to be lower in price than other types of habitat acreage. The limit the Trustees would spend is $750 per acre for an easement or half the projected purchase cost. Restoration costs are $250 per acre, and long-term operation and maintenance is $800 per acre. The land acquisition process is a lump sum of $30,000. Fencing is $1.50 per foot.

NRD document preparation is $15,000. The floristic quality baseline assessment is $8,000 per parcel based on a 40-acre parcel size. Trustee oversight and administration of the claim is $35,000.

As formerly mentioned, cost components can vary over time and scope of the proposal. Given that, the overall total is $3,426 per acre for this alternative based on one hundred forty-five acres required for compensatory restoration by preserving native prairie.

5.7 SUMMARY OF ALTERNATIVES USING NEPA FRAMEWORK

NEPA guidance conceptualizes the evaluation of alternatives in terms of the potential to affect biological, physical, social, cultural, and economic conditions. Many of these effects were discussed in previous sections, and Exhibit 2 summarizes the results using the NEPA framework.

EXHIBIT 2. Restoration Alternatives: Human Use and Ecological Risks

NAME	DESCRIPTION	HUMAN USE EFFECTS (SOCIAL, ECONOMIC, RECREATIONAL, AND CULTURAL)	ECOLOGICAL EFFECTS (PHYSICAL AND BIOLOGICAL RESOURCES)
Alternative 1	No action	• No significant changes anticipated.	• No significant improvement in environmental conditions anticipated.
Alternative 2	Complete restocking	• Recreational value of Smoots Creek enhanced.	• Replaces species lost from injured stream reach thus enhancing ecosystem integrity.
Alternative 3	Limited restocking	• Recreational value of Smoots Creek enhanced, although more limited than Alternative 2.	• Replaces species lost from injured stream reach thus enhancing ecosystem integrity, although to a much lesser degree than Alternative 2.
Alternative 4	Preserve stream habitat via riparian corridor	• Willing landowners will receive compensation in exhange for the sale of property or easements.	• Ecological services (habitat provision) will be compensated. • No effects to physical resources are anticipated.
Alternative 5	Preserve stream habitat via riparian corridor and native prairie	• Willing landowners will receive compensation in exhange for the sale of property or easements.	• Ecological services (habitat provision) will be compensated, although to a lesser degree than Alternative 4. • No effects to physical resources are anticipated.
Alternative 6	Preserve native prairie	• Willing landowners will receive compensation in exhange for the sale of property or easements.	• Ecological services (habitat provision) will be compensated, although to a lesser degree than Alternative 5. • No effects to physical resources are anticipated.

6. PREFERRED ALTERNATIVES

As noted in the previous chapter, the Trustees must consider a variety of factors in 43 CFR §11.82(c) in evaluating and choosing identified restoration alternatives. In general, exceptional alternatives are those that provide ecological services similar to those lost, are technically feasible with a high probability of success, are cost-effective, are unlikely to cause collateral injury to natural resources, pose little if any risk to public health, and comply with applicable laws and policies.

The Trustees' preferred alternatives are Alternative 3, limited restocking, and Alternative 5, preserving stream habitat via riparian corridor and native prairie. The Trustees preferred alternatives are based on the consideration of the factors set forth at 43 CFR §11.82(c) and that prior to developing this RP and EA, Magellan purchased a 157-acre parcel of property and made it available to the Trustees.

Alternative 3 is the least environmentally damaging of the two restocking alternatives. Restocking the channel catfish would compensate for past loss of this group of sport fish. This would essentially constitute immediate resource compensation of this group of aquatic fauna provided that fish are available. Thus, interim loss for this specific group of fauna would be negligible presuming that abrupt stocking would occur and thus preclude a lag period of natural recovery. The Trustees anticipate implementing this alternative would increase the recreational values of Smoots Creek though on a more limited basis than in Alternative 2. This alternative should not result in any significant collateral injury to the environment, poses no risk to the public health, and can be accomplished in a manner that is consistent with all laws and policies.

Alternative 5 would aim to preserve stream habitat via riparian corridor and native prairie. Furthermore, as previously mentioned, Magellan had previously purchased a 157-acre parcel of property through which Smoots Creek flows. The segment of Smoots Creek on the property was part of the overall length of Smoots Creek injured by the ammonia release. The property includes native prairie and riparian corridor along Smoots Creek. The availability of this property further reduces the estimated costs of this alternative compared with Alternative 4 because land purchase, the purchase process, and other applicable costs have been completed by Magellan. The benefits of this alternative are similar to those for Alternative 4 that is the maintenance of the protective buffering functions to surface waters provided by riparian corridor; though these functions are to a lesser degree than Alternative 4. However, the Trustees will obtain twelve more acres than the one hundred forty-five estimated for compensatory restoration, and as a result this should augment the buffering functions of the prairie habitat thereby equivocating the benefits of this alternative and Alternative 4.

The Trustees believe that protecting prairie habitat next to riparian corridor will enhance the recovery of aquatic and terrestrial organisms including federally and state-listed species as well as other fish and aquatic life. Healthy prairie habitat adjacent to riparian corridor would also contribute to overall water quality and ensure the health of the aquatic ecosystem. This would provide the needed habitat required for recovery and compensate the public for past and interim losses of aquatic resources. Preservation will ensure the availability of these ecologically valuable habitats for native aquatic and terrestrial flora and fauna. This alternative should not result in any significant collateral injury to the environment, poses no risk to the public health, and can be accomplished in a manner that is consistent with all laws and policies.

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