POA-1991-673, Tanana River
USACE Alaska District, Regulatory Division
Response to Remand

The following consists of the Alaska District response to the Appeal Officer, Mr. Thomas J. Cavanaugh's, 13 November 2009 decision with regards to the appeal of the jurisdictional determination completed for project POA-1991-673, Tanana River.

The site in questions is located in Fairbanks, Alaska, in Section 23, T. 1 S., R. 1 W., Fairbanks Meridian at Latitude 64.8196 N., Longitude 147.6859 W.

A request for a jurisdictional determination for the above described location (hereafter referred to as the "Killion site") was received on 7 January 2008. An approved jurisdictional determination was completed on 10 July 2008 stating the wetlands on the site are adjacent to the Tanana River. A request for appeal dated 8 September 2008 was received by POD on 18 September 2008. An appeal conference was held at the Fairbanks Field Office on 10 June 2009. The District received the administrative appeal decision on 13 November 2009.

The appeal decision remanded the jurisdictional determination back to the district and instructed them to reconsider its prior approved jurisdictional determination based on the instructions provided in the administrative appeal decision document. The decision document stated that the district had three options: "If the District's final decision is based on the existence of a hydrological connection between the Killion wetland and the Tanana River, it shall specifically document the existence of that hydrologic connection. If the District's final decision is based on reasonable proximity between the Killion wetland and a TNW, the District shall document the evaluation and consideration that led to its final decision. If the District's final decision is that the Killion wetland is not an adjacent wetland of the Tanana River, it shall conduct and document a significant nexus evaluation of the wetland to support its final conclusion as to the jurisdictional status of the wetland."(13 Nov 2009, Administrative Appeal Decision, Killion Property, File Number POA-1991-673).

The District has determined, based on the following analysis, that the Killion site is a wetland adjacent to the Tanana River, a traditional navigable water, due to its reasonable proximity to that waterway, and is therefore a water of the United States (U.S.) under the definition in 33 CFR § 328.3(a)(7).

The Corps has jurisdiction over wetlands adjacent to traditionally navigable waters. This authority was not upset by the Supreme Court's decision in *Rapanos v. United States*. 126 S. Ct. 2208 (2006). The basis for jurisdiction for adjacent wetlands is a reasonable inference of ecologic interconnection, and does not require satisfaction of the significant nexus test. *See id.* at 2248 (J. Kennedy, concurring).

Under Corps regulations, "[t]he term adjacent means bordering, contiguous, or neighboring. Wetlands separated from other waters of the United States by man-made

dikes or barriers, natural river berms, beach dunes and the like are 'adjacent wetlands.'" 33 C.F.R. § 328.3(c).

"Under this definition, the agencies consider wetlands adjacent if one of the following three criteria is satisfied. First, there is an unbroken surface or shallow sub-surface connection to jurisdictional waters. This hydrologic connection may be intermittent. Second, they are physically separated from jurisdictional waters by man-made dikes or barriers, natural river berms, beach dunes, and the like. Or third, their proximity to a jurisdictional water is reasonably close, supporting the science-based inference that such wetlands have an ecological interconnection with jurisdictional waters. Because of the scientific basis for this inference, determining whether a wetland is reasonably close to a jurisdictional water does not generally require a case specific demonstration of an ecologic interconnection. In the case of a jurisdictional water and a reasonably close wetland, such implied ecological interconnectivity is neither speculative nor insubstantial. For example, species, such as amphibians or anadromous and catadromous fish, move between such waters for spawning and their life stage requirements. Migratory species, however, shall not be used to support an ecologic interconnection. In assessing whether a wetland is reasonably close to a jurisdictional water, the proximity of the wetland (including all parts of a single wetland that has been divided by road crossing, ditches, berms, etc.) in question will be evaluated and shall not be evaluated together with other wetlands in the area." (see December 2, 2008 Rapanos guidance memorandum.)

The following analysis demonstrates that the wetlands on the Killion property are reasonably close to the Tanana River, and are therefore adjacent to the Tanana River. The presence of a highly transmissive shallow groundwater aquifer and the influence the Tanana River exerts on this shallow aquifer results in an ecologic interconnection between the wetland at the site and the Tanana River that is neither speculative nor insubstantial. This ecological interconnection is evident in the functions the subject wetlands provide, including filtration of contaminants, flood storage and wildlife habitat support.

1.0 General Site Description:

The wetlands at the Killion site are located in the South Fairbanks area, within the alluvial floodplain between the Tanana and Chena Rivers. The site is located within a depression that was at one time excavated (prior to 1966) for the extraction of gravel, and is now approximately 8 – 10 feet below the surrounding land surface elevation. The site contains Palustrine emergent, persistent, and palustrine unconsolidated bottom, mud (PEM and PUB) wetlands. It consists of a shallow open water pond with emergent obligate sedges and surrounded by willows.

Figure 1: Photograph taken June 2010, an example of the emergent wetlands found on Killion property.

The site is located approximately 1 mile to the south east of the Chena River, and approximately 1.7 miles to the north of the Tanana River (see Figure 2 below). It is located within the historic floodplains of both the Chena River and Tanana River.

2.0 Proximity:

The proximity of the Killion wetlands to the Tanana River, a Section 10 navigable waterway, is reasonably close for the following reasons: 1) it is located within the historic floodplains of both the Chena River and the Tanana River, 2) it is still mapped by the Federal Emergency Management Agency (FEMA) as being within the 100 year flood plain of the Tanana River, even with the presence of the levees, 3) it is within 1.7 miles of the Tanana River and 1.2 miles of the Chena River, and 4) it is in contact with the shallow groundwater aquifer that is driven by flow from the Tanana River. The presence of this highly transmissive shallow groundwater aquifer and the influence the Tanana River exerts on this shallow aquifer results in an ecologic interconnection between the wetland at the site and the Tanana River that is neither speculative nor insubstantial.

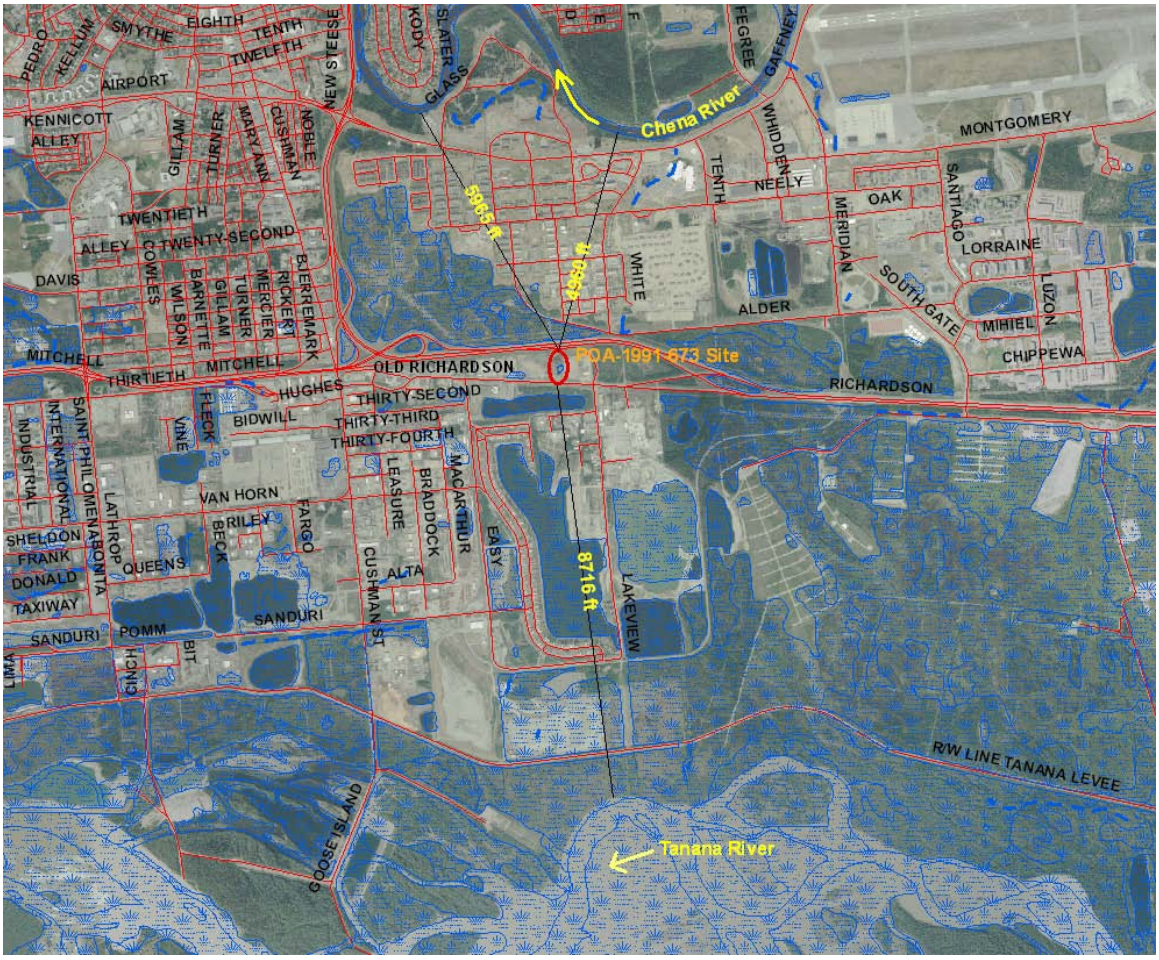

Figure 2: Geographical location of Killion wetlands within the Tanana River and Chena River alluvial plain.

2.1 Historical floodplain connection:

Historically, the site was directly connected to the Chena and Tanana Rivers during large flood events. For example, it was inundated during the 1967 flood of the Chena River, which was described as having a peak discharge 2.6 times the discharge of the 50-year flood (USGS, 1967). The flood extent stretched from north of the Chena River southward across the floodplain to south of the Tanana River. The construction of the Chena River Flood Control Project, including a diversion dam on the Chena and a levee along the Tanana River, has restricted flooding across the floodplain. However, even with the presence of the Tanana River levee the site is still mapped as being within the 100 year flood plain of the Tanana River (FEMA 2008).

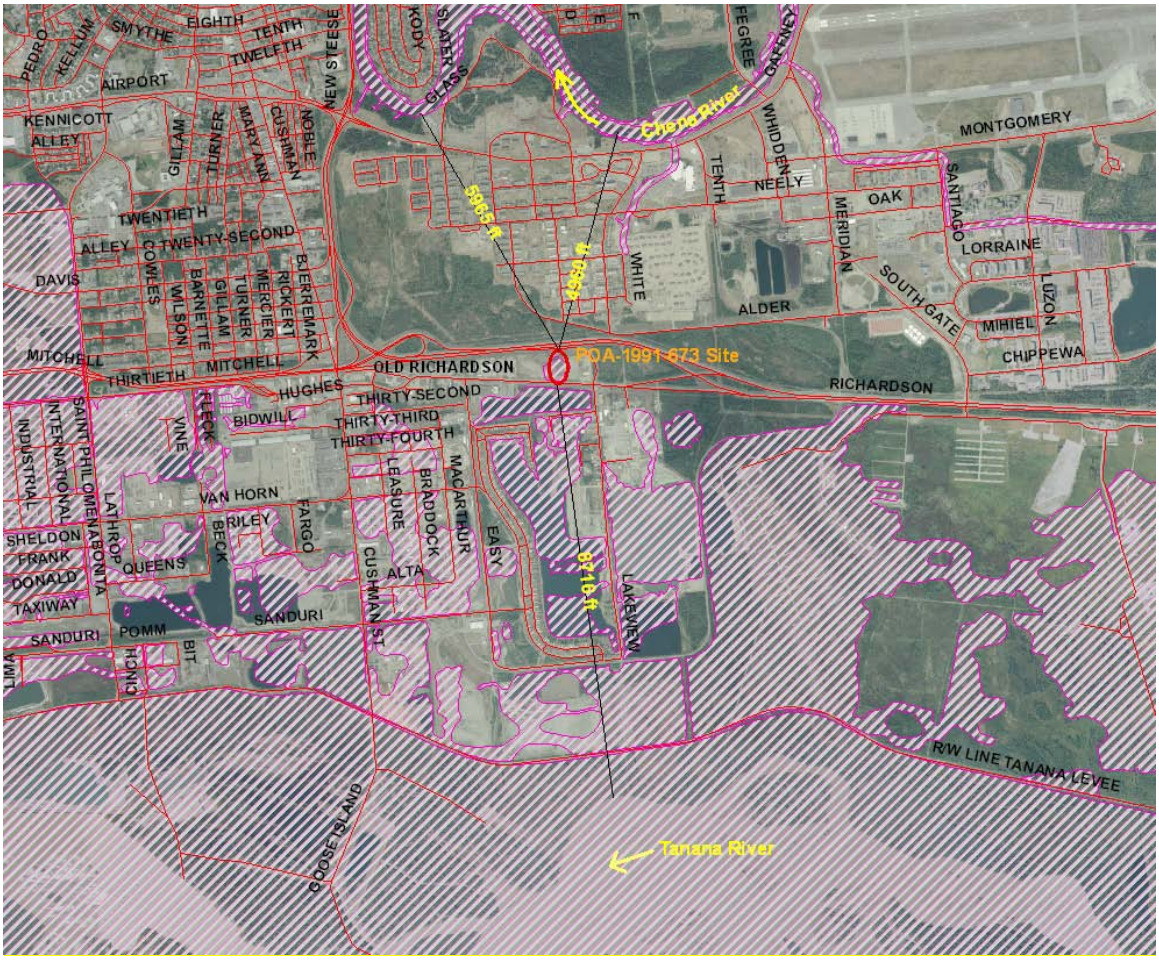

Figure 3: Most current FEMA floodplain mapping from the Fairbanks North Star Borough GIS website. Pink diagonal lines indicate 100 year floodplain.

2.2) Current floodplain connection:

According to the most current FEMA floodplain mapping (FEMA 2008), the Killion site is still mapped as being within the 100 year floodplain despite its separation from surface flows to or from nearby water features (See Figure 3 above). The Chena Lakes Flood Control project was constructed to minimize flooding in Fairbanks from both the Chena River and the Tanana River (Cedegren 1972). The Tanana River Levee, built as part of that Project, has artificially constrained surface flooding. However, groundwater flooding still naturally occurs in the South Fairbanks area due to the highly transmissive shallow ground water aquifer and the influence the Tanana River exerts on the groundwater levels and movement. The Flood Insurance Mapping Study for the South Fairbanks Local Drainage, June 2008 reported that "the flood control projects on the Chena and Tanana rivers do not provide protection from high groundwater flooding because of the highly permeable soils, characteristic in the broad alluvial valley" (FEMA 2008). Also "based on the conclusion that seepage is the prominent flooding source in the study area the current floodplain mapping effort only considers groundwater flooding and ignores flooding that may occur as a result of rainfall on the local study area" (FEMA

2008). The groundwater in the alluvial plain that could contribute to such flooding is most strongly influenced by river stage changes in the Tanana River (USGS 1996).

2.3) Shallow groundwater table and ecological interconnection:

The existence of the highly transmissive shallow aquifer between the Chena River and the Tanana River, and the influence the Tanana River exerts over this aquifer is well documented (Cedegren 1972, USGS 1996). Ground water flow in the alluvial plain between the Chena and Tanana Rivers, where the project site is located, is from the southeast to the northwest, from the Tanana River to the Chena River (Cedegren 1972, USGS 1996). The permeable sands and gravels form a "highly transmissive" aquifer (Corps 1995). Results of pump tests conducted in the sand/gravel alluvium along the Tanana Levee found hydraulic conductivity values from 500 to 1200 feet per day (Cedergren 1972).

The USGS report on Ground-Water Levels from 1986-93 found that "water levels in wells within about a half a mile of either river responded rapidly to changes in river stage" (USGS 1996). In the 1972 Seepage Analysis for the Chena River Lakes Project, Mr. H.R. Cedegren reported that "evidences of very high permeabilities in the gravel formations underlying the proposed levee alignments in the Fairbanks area are given by the very rapid rise and fall of water levels in observation wells in the area during a following changes in adjacent river levels" (Cedegren 1972). The report points out one well that "in a period of only a few hours, while the Chena River rose about 17 feet, an observation well at Ft. Wainwright with an automatic recording device, showed a water level rise of nearly 14 feet. Such a rapid rise in the water level in this well, which is about 2,000 feet from the Chena River, is an indication of material of extremely high permeability"(Cedegren 1972). Additionally, monitoring of groundwater wells within the Chena River Lakes Flood Control Project Floodway, and also to the west of the dam (hydrologically downgradient) during the 2008 flood peak on July 30, 2008 of 106,000 cubic feet per second (cfs), showed a well approximately 9500 feet from the Tanana River (Well DSAP-09 on Figure 4 below) responded to changes in water surface elevation in the Tanana River within 12 to 24 hours, and peaked 15 days after peak flow in the Tanana peaked (approximately 1.5' rise in water surface elevation in well) (communication with Crane Johnson, USACE Hydraulic Engineer, 2 June 2010.) This well is located approximately 12 miles to the east of the Killion site. It is located within the alluvial plain between the Tanana River and the Chena River, with similar soil characteristics.

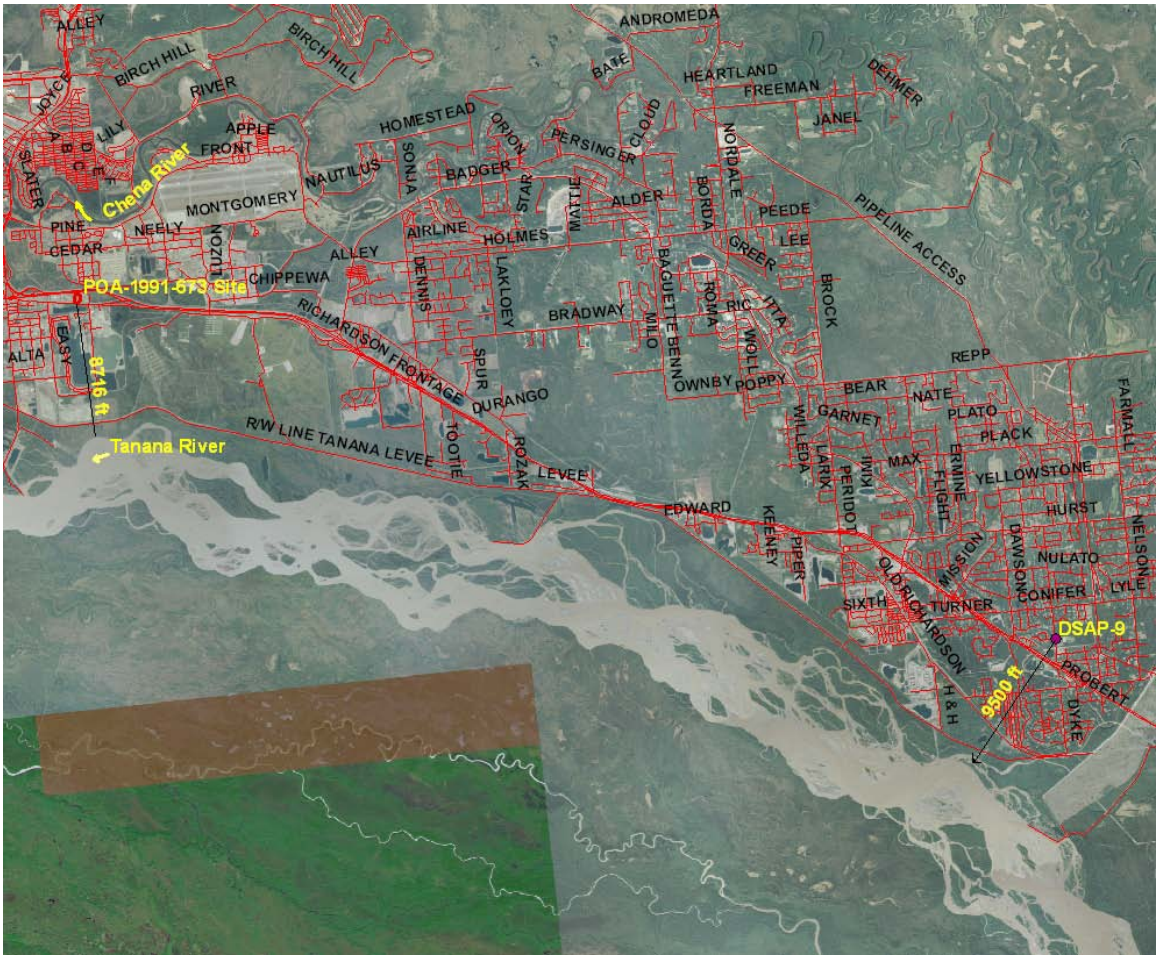

Figure 4. Vicinity map of well DSAP-9.

Generally, wetland hydrology in the alluvial plain between the Chena River and the Tanana River has two sources, 1) it is sustained by the shallow groundwater aquifer or 2) it consists of surface runoff that remains perched by permafrost. These two water sources may also act in combination; for example via upwellings through discontinuous permafrost or when the seasonal frost melts allowing the regional groundwater to come to the surface. The persistent moisture and shallow inundation at the Killion site derives primarily from the groundwater emanating from the Tanana River, and not from surface water perched on permafrost or another confining layer. Without the input from the shallow groundwater, it is likely the wetland would not exist. There are several indicators that the hydrology for this specific site is provided by the shallow groundwater table and not surface water perched on permafrost:

1) Permafrost in the South Fairbanks area is mapped as intermittent permafrost (USGS 1975). The USGS 1975 Map of Permafrost, Fairbanks D-2 SE, maps the Killion area as Category III. Category III permafrost has low ice content, is discontinuous in many areas such as beneath lakes, river, and creeks, and when present, is 25-40' below the surface in areas that have been cleared. The Killion site was cleared and excavated sometime prior to 1966 (the date of the base map of the Permafrost Map

that shows the Killion site as a "gravel pit"). In addition, studies have shown that permafrost in the South Fairbanks area has been degrading (FEMA 2008);

2) The soils within the site were mapped as Tanana Soils in the Soil Survey of Fairbanks Area, Alaska, 1963 (Soil Survey Series, 1959, No. 25, Sheet #10). The soil survey states that "under native vegetation, the soil is perennially frozen at a depth of 30 inches or less. After the mat of moss has been cleared, the depth to permafrost generally increases to more than 6 feet. When this occurs, excess moisture can percolate through the soil" (USDA 1963). As stated above, the Killion site was cleared and excavated sometime prior to 1966 (the date of the base map of the Permafrost Map that maps the Killion site as a "gravel pit"). Since Tanana Soils tend to drain after disturbance, the source of the water necessary to support wetlands must be coming from the shallow groundwater aquifer.
3) Average precipitation from June through September is 6.0 inches, but as much as 76 to 100 percent of this input may be lost as evapotranspiration (Gieck and Kane 1986). The current contributing area of the site is quite small, and the amount of precipitation received in Fairbanks low enough that it is highly unlikely that surface water contributions would be enough to sustain the perennial wetland ponds on the site without drying up.
4) Vegetation observed on site is indicative of wetlands that receive inputs of nutrients from groundwater and/or near surface flow and are not hydrologically isolated from groundwater (see discussion in 2.3.1 below).
5) Studies show that this aquifer ranges from 5 feet to 10 feet below the land surface, and in some area at or above the land surface (USGS 1996). The sharp topographic depression that contains the subject area wetland appears to be low enough in the landscape to intercept the regional water table. This is also consistent with the designation of the site as a gravel pit in the USGS 1975 Map of Permafrost, Fairbanks D-2 SE.

2.3.1 Ecological Interconnection:

Although a discussion regarding an ecological interconnection is not required to show adjacency, it is included here to provide evidence that the wetlands on the Killion property are reasonably close to the Tanana River, a traditional navigable water. Ecological factors important when assessing ecological interconnection between a traditionally navigable waterway (TNW) and its tributaries and associated wetlands include, but are not limited to, the following:

1) capacity to carry pollutants or flood waters to TNW's, or to trap/filter/store pollutants or flood waters that would reach a TNW
2) provision of habitat and lifecycle support for fish, amphibians and other wetland-dependent species present in the TNW
3) capacity to transfer nutrients and organic carbon that support downstream foodwebs
4) other relationships to the physical, chemical or biological integrity of the TNW

The highly transmissive shallow nature of the aquifer, which is the source water for the Killion site, provides the ecological interconnection between the subject area and the

Tanana River. As discussed above, the groundwater connection and thus the ecological connection extends to the Chena River as well, which is a tributary of the Tanana River as well as being a traditional navigable water.

Groundwater / surface water transition zones "occur in stream, river, estuarine, marine, lake, and wetland settings, and may include the mixing of cold and warm waters, fresh and marine waters, or waters having other physical or chemical differences"(EPA 2008). The groundwater / surface water transition zone "represents a region beneath the bottom of a surface-water body where conditions change from a ground-water dominated to surface-water dominated system within the substrate. It is a region that includes both the interface between ground-water and surface-water as well as the broader region in the substrate … where ground-water and surface-water mix." (EPA 2008). In the EPA's ECO Update/Ground Water Forum Issue Paper it states that:

> In the past, ground-water and surface-water were typically viewed as separate compartments of an aquatic ecosystem, connected at the sediment/surface-water boundary. This paradigm ignored (1) the ecosystem that occurs within the transition zone, (2) the important geochemical and biological roles this zone may have in the local ecosystem (i.e., Gibert et al. 1994), and (3) the dynamic nature of this zone that results from the highly variable flow conditions in ground-water and surface-water.(EPA 2008)

The ECO paper states that these transition zones are "a vital habitat that is interconnected with, and supports the surface-water ecosystem" (EPA 2008).

The wetlands of the Killion site are an integral part of the aquatic environment and serve to reduce the input of sediment, hydrocarbons and other pollutants into the shallow groundwater aquifer. Therefore, the subject areas wetlands help maintain the integrity of waters of the U.S.

The wetlands also support a wide variety of local plants, animals and other organisms that rely on wetland areas. The site's floristic composition is typical of wetlands occurring along the Tanana River in the vicinity. Wetland vegetation is dominated by diamond willow (*Salix pulchra*) and bluejoint (*Calamagrostis canadensis*) with several other species including many willow species (*S. glauca, S. bebbiana, S. interior*), sweetgale (*Myrica gale*), beaked sedge (*Carex utriculata*), marsh cinquefoil (*Comarum palustris*), swamp horsetail (*Equisetum fluviatile*), yellow water-crowfoot (*Ranunculus gmelini*) and common cattail (*Typha latifolia*).

The vegetation present is representative of wetlands that receive substantial inputs of nutrients from groundwater and/or near surface flow and are not hydrologically isolated from groundwater. Marsh cinquefoil, swamp horsetail, beaked sedge and common cattail are abundant in the extensive non-acidic wetlands (fens) located south of the Tanana River a few miles downriver of Fairbanks where upwelling of groundwater from the Alaska Range delivers high levels of nutrients (Jorgenson et al. 1999). Wetlands in interior Alaska that are isolated from groundwater and receive little near surface flow

typically support plant species adapted to low nutrient, low pH conditions characteristic of bogs and poor fens. Such species include Sphagnum mosses (*Sphagnum* spp.), leatherleaf (*Chamaedaphne calyculata*), bog blueberry (*Vaccinium uliginosum*), bog rosemary (*Adromeda polifolia*), and several others (Viereck and Little, Jr. 2007, Johnson et al. 1995). None of these species are present at the Killion wetland site.

Moose (*Alces alces*), which depend on aquatic environments for forage, shelter, calving and rearing, are utilizing the site. Moose droppings and evidence of moose browse were observed during a site visit in June 2010. Moose are known to travel as far as just a few miles, up to 60 miles to reach calving, rutting, and wintering areas. (http://www.adfg.state.ak.us/pubs/notebook/biggame/moose.php, accessed June 1, 2010). The movement of moose from the Killion wetland area to the Tanana River riparian corridor, is one example of the ecological interconnectivity of the Killion site and a TNW.

Conclusion:

The Killion wetland is a water of the United States (U.S.) because it is adjacent to the Tanana River, a traditional navigable water, due to its reasonable proximity to the Tanana River. Its reasonable proximity is evident in the ecological interconnectivity of the site with a TNW. Additionally, the site is in the historic 100 year surface water floodplain of the Tanana River, and is currently mapped by FEMA as being within the current 100 year groundwater floodplain.

Works Cited:

Cedegren, H.R. *Seepage Analysis, Chena River Lakes Project, Fairbanks, Alaska. Seepage Study Report.* Prepared for the Alaska District, Corps of Engineers. January 1972. Print. (Cedegren 1972)

Childers, Joseph M., Meckel, James P. *Flood of August 1967 at Fairbanks, Alaska.* Departmen of Interior, U.S. Geological Survey Hydrologic Investigations Atlas HA-294. 1967. Print. (USGS 1967)

Corps (U.S. Army Corps of Engineers). 1995. The development and application of initial hydrogeologic flow model for the Chena River Lakes Flood Control Project. U.S. Army Corps of Engineers, Hydrologic Engineering Center. Davis, CA.

Fairbanks Northstar Borough, ArcGIS Floodplain mapping. http://gis.co.fairbanks.ak.us/

Gieck, R. E. and Kane, D. L. 1986. Hydrology of two subarctic watersheds. Pages 283-291 in D.L. Kane, editor. Cold Regions Hydrology Symposium. American Water Resources Association. Fairbanks, AK.

Glass, Roy L., Lilly, Michael R., and Meyer, David F. *Ground-Water Levels in an Alluvial Plain Between the Tanana and Chena Rivers Near Fairbanks, Alaska, 1986-1993.* U.S. Geological Survey Water-Resources Investigations Report 96-4060. 1996. Print. (USFS 1996).

Johnson, Crane. Personal communication and email communication. June 2, 2010. Unpublished groundwater data sent via email on December 16, 2009.

Johnson, D., L. Kershaw, A. MacKinnon, and J. Pojar. 1995. Plants of the western boreal forest & aspen parkland. Lone Pine Publishing and the Canadian Forest Service. Edmonton, Alberta, Canada.

Jorgenson, M.T., J.E. Roth, M.K. Raynolds, M.D. Smith, W. Lentz, A.L. Zusi-Cobb, and C.H. Racine. 1999. An ecological land survey for Fort Wainwright, Alaska, CRREL Report 99-9, U.S. Army Corps of Engineers, Cold Regions Research & Engineering Laboratory, Hanover, NH.

Pewe, Troy L., Bell, John W. *Map Showing Distribution of Permafrost in the Fairbanks D-2 SE Quadrangle, Alaska.* U.S. Geological Studies Miscellaneous Field Study Map MF-669A. 1975. (USGS 1975)

Rausch, Robert A., Gasaway, Bill and Schwartz, Charles. "Moose." Alaska Department of Fish and Game, 2008. Web 1 June 2010. http://www.adfg.state.ak.us/pubs/notebook/biggame/moose.php. (Rausch et al, 2008)

United States Department of Agriculture. Soil Conservation Service. *Soil Survey of Fairbanks, Area, Alaska.* Series 1959, No. 25. GPO, 1963. Print. (USDA 1963)

United States Environmental Protection Agency. ECO Update/Ground Water Forum Issue Paper. Publication 9285.6-17 EPA-540-R-06-072, July 2008. (EPA 2008)

United States. Federal Emergency Management Agency. *Flood Insurance Mapping Study for South Fairbanks Local Drainage. Fairbanks North Star Borough, AK and Incorporated Area, Community Number – 025009.* Prepared by Northwest Hydraulic Consultants Inc. June 2008. Print. (FEMA, 2008)

Viereck, L.A. and E.L. Little, Jr. 2007. Alaska trees and shrubs, 2nd edition. University of Alaska Press. Fairbanks, Alaska.