**Ecosystem Type: TUNDRA**

**Category: Clean and Plentiful Waters**

1. **Materials**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** – not applicable

1. **Nutrition**

***Supplier*** – not applicable

***Driver*** -not applicable

***Demander*** - not applicable

1. **Energy**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** – not applicable

1. **Mediation of Waste, Toxics, and Other Nuisances**

***Supplier*** – The unique habitats created by tundras, such as the thawed layer under the permafrost, enables the exchange of nutrients and wastes (Greenwald et al., 2008). This helps maintain water quality. Tundra soils have the ability to assimilate nitrates, removing them from the water column to maintain clean waterways (Tye and Heaton, 2007).

***Driver*** – not applicable

***Demander*** – not applicable

1. **Mediation of Flows**

***Supplier*** – Tundras create unique habitats, such as a thawed sediment layer under streambeds, because they are under permafrost. This thawed layer allows for the exchange and flow of nutrients, not only cleaning nutrients out of water, but also transforming them to maintain overall water quality (Greenwald et al., 2008). Further, tundras create a supply of water as they thaw from the uplands into surrounding habitats (Marsh and Pomeroy, 1996; Curasi, Loranty, and Natali, 2016).

***Driver*** – not applicable

***Demander*** – not applicable

1. **Maintenance of Physical, Chemical, and Biological Indicators**

***Supplier*** – The location of tundras in the arctic keeps the land under permafrost, but also creates unique microsystems that better maintain water quality and the nutrient balance. One study found that streams in the tundra always had a thawed layer of sediment under the permafrost surface, allowing significant nutrient exchange between the channel and stream bottom (Greenwald et al., 2008).

***Driver*** – not applicable

***Demander*** – not applicable

1. **Spiritual, Symbolic, Religious, and Social Experiences**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** – not applicable

1. **Physical and Intellectual Interactions w/ Biota, Ecosystems, and Land/Seascapes**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** - not applicable

**Sources:**

Curasi, S.R., Loranty, M.M., and Natali, S.M. (2016) Water track distribution and effects on carbon dioxide flux in an eastern Siberian upland tundra landscape. *Environmental Research Letters, 11,*

Greenwald, M.J. et al. (2008) Hyporheic exchange and water chemistry of two arctic tundra streams of contrasting geomorphology. *Journal of Geophysical Research, 113*, G02029. DOI: 10.1029/2007JG000549.

Marsh, P. and Pomeroy, J.W. (1996) Meltwater Fluxes at an Arctic Forest-Tundra Site. *Hydrological Processes, 10*(10), 1383-1400. DOI: 10.1002/(SICI)1099-1085(199610)10:10<1383::AID-HYP468>3.0.CO;2-W. [abstract only]

Tye, A.M. and Heaton, T.H.E. (2007) Chemical and isotopic characteristics of weathering and nitrogen release in non-glacial drainage waters on Arctic tundra, *Geochimica et Cosmochimica Acta, 71*(17), 4188-4205. DOI: 10.1016/j.gca.2007.06.040.