Appendix 5 – EPA's 2019 Designation of the MS4 Owned and/or Operated by the University of Idaho as a Regulated Small MS4

This Appendix contains EPA's initial designation document as sent to the University in 2019.

Information in the designation document provides the basis for finalizing the designation of the University as a regulated MS4.

Designation of the University of Idaho Municipal Separate Storm Sewer System (MS4) As A Regulated Small MS4

June 2019

I. Introduction

Under Clean Water Act (CWA) Section 402(p), 33 U.S.C. § 1342(p), Congress required the U.S. Environmental Protection Agency (EPA) to establish National Pollutant Discharge Elimination System (NPDES) permitting requirements for certain stormwater discharges. Among other types of stormwater discharges requiring permits, CWA Section 402(p)(2)(e), 33 U.S.C. § 1342(p)(2)(E), provides that the permitting authority may, on a case-by-case basis, determine that a stormwater discharge requires a NPDES permit if the discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the U.S. *See also* 40 CFR § 123.35(a)(1). This authority to require NPDES permits for otherwise unregulated stormwater sources is commonly referred to as the "Residual Designation" authority. In addition, the EPA established stormwater regulations in two phases: Phase I, 55 Fed. Reg. 47,990 (Nov. 16, 1990); and Phase II, 64 Fed. Reg. 68,781 (Dec. 8, 1999). These regulations describe a program that requires many municipal separate storm sewer systems (MS4s) to obtain NPDES permit coverage.

This decision document constitutes the EPA's initial designation of the University of Idaho (University) MS4, in Latah County, Idaho, as a regulated small MS4. As discussed in detail below, the EPA has determined that the University's discharges (1) contribute to an exceedance of water quality standards and/or (2) are a significant contributor of pollutants to waters of the U.S. Therefore, the EPA is designating the discharges from the University's MS4 for regulation under the NPDES program.

Within 180 days of receipt of this initial designation the University of Idaho must submit an NPDES permit application for the discharges from their MS4. See 40 CFR § 122.26(a)(9). The EPA will subsequently propose for public comment a draft NPDES permit to authorize the MS4 discharges. Whether this initial designation is proper will remain open during the public comment period on that draft NPDES permit. See 40 CFR § 124.52(b)-(c). After consideration of all public comments, the EPA will issue a final designation decision along with its final permit decision.

II. Residual Designation Authority

CWA Section 402(p)(2)(e), 33 U.S.C. § 1342(p)(2)(E), provides that the permitting authority may, on a case-by-case basis, determine that a stormwater discharge requires a NPDES permit if the discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the U.S. *See also* 40 CFR § 123.35(a)(1). 40 CFR § 122.26(a)(1)(v) provides that in deciding whether to designate an MS4 as a regulated MS4 subject to NPDES permitting based on its contribution to a violation of a water quality standard or as a significant contributor of pollutants to waters of the United States, the Director may consider the following factors:

(A) The location of the discharge with respect to waters of the United States;

(B) The size of the discharge;

(C) The quantity and nature of the pollutants discharged to waters of the United States; and

(D) Other relevant factors.

40 CFR § 122.26(a)(1)(v)(A) – (D).

In addition, when the EPA promulgated its Phase II Stormwater Regulations in 1999, it designated small MS4s and small construction activity (1-5 acres) for NPDES permitting "to protect water quality." The EPA carried forward the residual designation authority of CWA Section 402(p)(2)(E) along with the authority of (p)(6) as a basis for promulgation of a new residual designation regulation, 40 CFR § 122.26(a)(9)(i)(C)-(D). The preamble to the rule explained that the rule "carries forward" or "preserves" the ability of the EPA and/or the states to designate otherwise unregulated stormwater discharges, individually or categorically, and locally or regionally, for NPDES permitting as necessary to protect water quality. 64 Fed. Reg. 68,781 (Dec. 8, 1999). The U.S. Court of Appeals for the Ninth Circuit upheld the provision on this basis. *Environmental Defense Center, Inc. v. U.S. Environmental Protection Agency, et al.*, 344 F.3d 832, 875 (9th Cir. 2003) (*EDC*).[1]

In doing so, the EPA preserved the discretionary authority of the EPA and states to designate as-yet-unidentified discharges for NPDES permitting, on a case-by-case basis, as necessary and to protect water quality, where the EPA lacked sufficient data to designate on a nationwide basis. 40 CFR § 122.26(a)(9)(i)(D); 64 Fed. Reg. at 68,781. Specifically, "for discharges composed entirely of storm water, that are not required by paragraph (a)(1) of this section to obtain a permit, operators shall be required to obtain a NPDES permit only if," among other circumstances, the State NPDES Program Director or the EPA Regional Administrator "determines that the discharge, or category of discharges within a geographic area, contributes to a violation of a water quality standard *or* is a significant contributor of pollutants to waters of the United States." 40 CFR § 122.26(a)(9)(i)(D) (emphasis added). *See* 64 Fed. Reg. at 68,781. As noted above, the Ninth Circuit upheld this "residual designation authority" as grounded in and consistent with both CWA Section 402(p)(6) and Section 402(p)(2)(E). *EDC* at 876 (9th Cir. 2003).

The Phase II rule also tasked state NPDES permitting authorities with evaluating small MS4s in non-Census-designated urbanized areas to determine whether NPDES permits are appropriate to protect water quality. 40 CFR § 123.35(b). The NPDES permitting authorities were required to develop a process as well as their own designation criteria for this task. *See id.* In determining significant water quality impacts (i.e., whether the discharge is a significant contributor of pollutants), the EPA recommended "a balanced consideration of the following criteria on a watershed or other local basis: discharge to sensitive waters, high growth or growth potential, high population density, contiguity to an urbanized area, significant contributor of pollutants to waters of the United States, and ineffective protection of water quality by other programs." 40 CFR § 123.35(b)(1)(ii).[2]

[1] "The residual designation authority is grounded both on § 402(p)(6), which broadly authorizes a comprehensive program to protect water quality, and on § 402(p)(2)(5), [sic], which authorizes case-by-case designation of certain polluters and categories of polluters." *Id.*

[2] The guidance about designating additional MS4s outside the urbanized area for NPDES permitting appears in a section of the regulation that establishes requirements for EPA-approved state NPDES programs. When the EPA is the permitting authority, these criteria are also helpful in evaluating whether MS4s not designated by existing regulation should be required to obtain NPDES permits either because they contribute to a violation of a WQS or as "significant contributors of pollutants to waters of the U.S" with inadequate controls on the discharges. When describing the state program regulations in the preamble to the Phase II rule, the EPA clearly referred to states only in their capacity as NPDES permitting authorities. As a general matter, the EPA is required to use the same methods and procedures for implementing the NPDES permit program as it requires of State programs. *See also* CWA § 402(a)(3).

III. Characterizing Stormwater Discharges

General Characteristics of Stormwater from MS4s

MS4 discharges are comprised primarily of urban stormwater.[3] Such discharges typically contain elevated concentrations of pollutants that collect on impervious surfaces, such as streets, driveways, parking lots, and sidewalks. Many studies confirm that the level of imperviousness in an area strongly correlates with the quality of the nearby receiving waters. Urban development creates new pollution sources as population density increases; more people in less space results in greater concentration of pollutants (such as vehicle maintenance waste, pet waste, litter, household hazardous waste, and the like) that can be mobilized by stormwater and discharged from MS4s.[4]

The first national assessment of urban stormwater quality was undertaken for the *Nationwide Urban Runoff Program (NURP)* study in the late 1970s and early 1980s. Overall, data from the NURP study indicated that discharges from separate storm sewer systems draining stormwater from residential, commercial, and light industrial areas carried more than ten times the annual loadings of total suspended solids (TSS) than discharges from municipal sewage treatment plants that provide secondary treatment. The NURP study also indicated that stormwater discharges from residential and commercial areas carried somewhat higher annual loadings of chemical oxygen demand (COD), total lead, and total copper than effluent from secondary treatment plants, as well as high levels of bacteria during warm weather conditions.[5]

The National Stormwater Quality Database (NSQD) indicates significant variations in pollutant loadings among different land uses, however, the data confirm the significance of discharges from MS4s as contributors of pollutants to waters of the United States. For example, the average TSS concentration for all urban stormwater samples was 62.0 mg/L, more than double the 30-day average limit of 30 mg/L for discharges from municipal sewage treatment plants that provide secondary treatment.[6] The median fecal coliform concentration was 4300 mpn/100 mL, which exceeds the former National Recommended Water Quality Criteria (NRWQC) for bathing waters by an order of magnitude.[7]

Population density is related to the level of human activity within an urban setting. Urbanization is directly linked to the amount of total impervious land surfaces within the area. Urbanization alters the natural infiltration capacity of the land, and associated human activity generates a host of pollutants. Impervious land cover causes increasing volumes of stormwater discharges to the receiving water body; receiving water quality is negatively affected by increased pollutant loadings from the impervious land. Various studies

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[3] The term "urban stormwater" is not defined by regulation, nor does it appear in the text of the EPA's storm water regulations. Consistent with the EPA's usage in the preamble to the Phase I and II regulations, the term is used in this document to refer to stormwater discharges from urban areas, including residential, commercial, industrial and mixed-use areas, through separate storm sewers. *See e.g.,* 64 Fed. Reg. at 68,725 – 68,728 (Dec. 8, 1999).

[4] 64 Fed. Reg. at 68,725 (Dec. 8, 1999).

[5] EPA 1983.

[6] Available at http://unix.eng.ua.edu/~rpitt/Research/ms4/Paper/Mainms4paper.html. The NSQD data is summarized in NRC 2008, Table 3-4, pages 155-158.

[7] See EPA's Redbook, Quality Criteria for Water (July 1976) at 79, available at http://water.epa.gov/scitech/swguidance/waterquality/standards/current/index.cfm.

indicate that the amount of imperviousness within an area strongly correlates with adverse water quality impacts of nearby receiving waters.[8]

Characteristics of Stormwater Discharge from the University of Idaho MS4

The University is the state's land-grant research university. The University operates a residential campus that occupies approximately 2.4 square miles within the City of Moscow (Moscow), in Latah County, Idaho. See Figures 1, 2 and 3 below. Land-use types that characterize the campus as it exists today include academic, athletics and recreation; traditional agricultural; housing, transportation/parking; campus and community service operations; and open spaces. The University operates in a manner akin to a small municipal city, insofar as the University plans, constructs, operates, and maintains many of its own utilities and infrastructure, including storm water collection, treatment, and discharge.[9]

The University's properties are drained by a storm sewer system that both interconnects to Moscow's MS4, and discharges directly to Paradise Creek.[10]

Status of Receiving Water

Paradise Creek is part of the Palouse Subbasin [Hydrologic Unit Code 17060108] and flows from its headwaters on Moscow Mountain in the Palouse Range, through Moscow and the University's campus, to the west across the Idaho/Washington State line and enters the South Fork of the Palouse River near the eastern boundary of the City of Pullman, Washington.[11] See Figures 3 and 4 below.

The State of Idaho water quality standards at IDAPA 58.01.02.120.01 establish beneficial uses for Paradise Creek as cold water aquatic life and secondary contact recreation.

Idaho Department of Environmental Quality's (IDEQ) 2014 *Integrated Section 303(d)/Section 305(b) Report* (2014 Integrated Report) contains the list of impaired water bodies in Idaho required by CWA Sections 305(b), 303(d) and 314.[12] The segment of Paradise Creek that flows through the University's campus, Assessment Unit ID 17060108CL005_02 (identified as *Paradise Creek, from the eastern urban boundary to Idaho/Washington border*), is listed in the 2014 Integrated Report as impaired for ammonia, fecal coliform, *E.*

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[8] 64 Fed. Reg. at 68,725 (Dec. 8, 1999).

[9] *University of Idaho Long Range Campus Development Plan (2000)*, especially pages 27-29. https://www.uidaho.edu/infrastructure/facilities/aes/campus-development-plan. For example, the University also maintains fiscal and operational responsibilities for steam generation and distribution and electrical energy distribution; for its own domestic water wells, water storage and distribution of water systems; for reclaimed water collection, treatment and distribution; for chilled water production and distribution; and for sanitary sewage collection and delivery to the community treatment facility.

[10] Moscow 2009.

[11] University of Idaho, 2000; and University of Idaho, 2009.

[12] See IDAPA 58.01.02.120.01 https://adminrules.idaho.gov/rules/2017%20Archive/58/0102.pdf#G2.503877; also, IDEQ's 2014 Integrated Report is available online at: https://www.deq.idaho.gov/assistance-resources/maps-data/. All applicable Idaho TMDL documents are available on IDEQ's website at http://deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls/

coli, nutrient/eutrophication, biological indicators, sedimentation/siltation and temperature.[13] The segments immediately upstream of the eastern urban boundary (Assessment Unit ID 17060108CL005_02a, *Paradise Creek from forest habitat boundary to urban boundary)*; and Assessment Unit ID 17060108CL005_02b, *Paradise Creek from source to forest habitat boundary*) are also listed as impaired for *E.coli.*

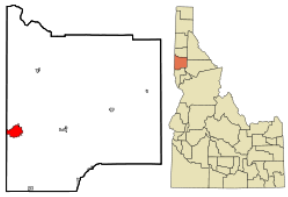
The Washington Department of Ecology's (WDOE) *2015 Water Quality Assessment 305(b) Report and 303(d) list* (WDOE's 303(d) list) identifies the portion of Paradise Creek in Washington State as being impaired for fecal coliform, ammonia, and nutrients. Paradise Creek is a tributary of the South Fork of the Palouse River, which the WDOE lists as impaired for fecal coliform, dissolved oxygen, temperature, and polychlorinated biphenyls (PCBs).[14]

[13] IDEQ previously listed Paradise Creek as impaired for fecal coliform; *E. coli* is currently listed as the impairment due to a change in Idaho's water quality standards regarding secondary contact recreation criteria from a criterion associated with fecal coliform to a more specific criterion for *E. coli*. Note that Paradise Creek and South Fork Palouse River have been listed as impaired by IDEQ in its 1994, 2002, 2010, and 2012 Integrated Reports. Also note that IDEQ considers the Idaho portion of the South Fork Palouse Assessment Unit ID 17060108CL002_03, to be impaired for sediment, nutrients, bacteria and temperature.

[14] See the WDOE *2015 Water Quality Assessment 305(b) Report and 303(d) list*, http://www.ecy.wa.gov/programs/wq/303d/index.html. Note that these waters were also listed as impaired in the WDOE 2004 CWA Section 303(d) report, http://www.ecy.wa.gov/programs/wq/303d/2002/2002-index.html

Figure 1. University of Idaho Campus Properties in Paradise Creek/South Fork Palouse River Watershed.

Derived from University of Idaho's Interactive Campus Maps, https://facilities.dfm.uidaho.edu/A/Download/geolocation2.html.



Note: The border representing the WA/ID state line extends north/south and is indicated by a vertical gray line.

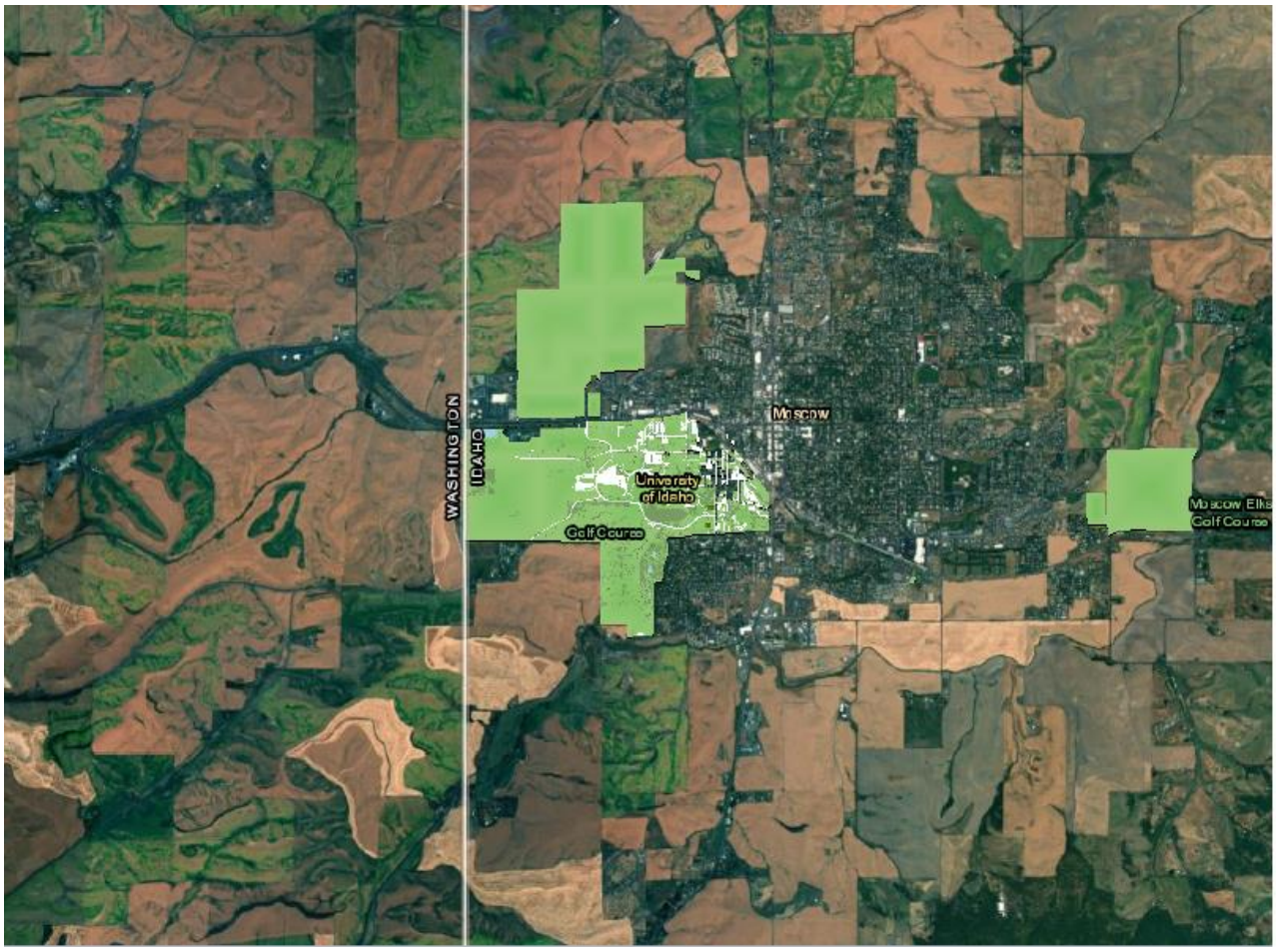


Figure 2. University of Idaho Long Range Campus Development Plan – Illustrative Plan

At: https://www.uidaho.edu/infrastructure/facilities/aes/campus-development-plan/illustrative-plan
See: University of Idaho, 2018.

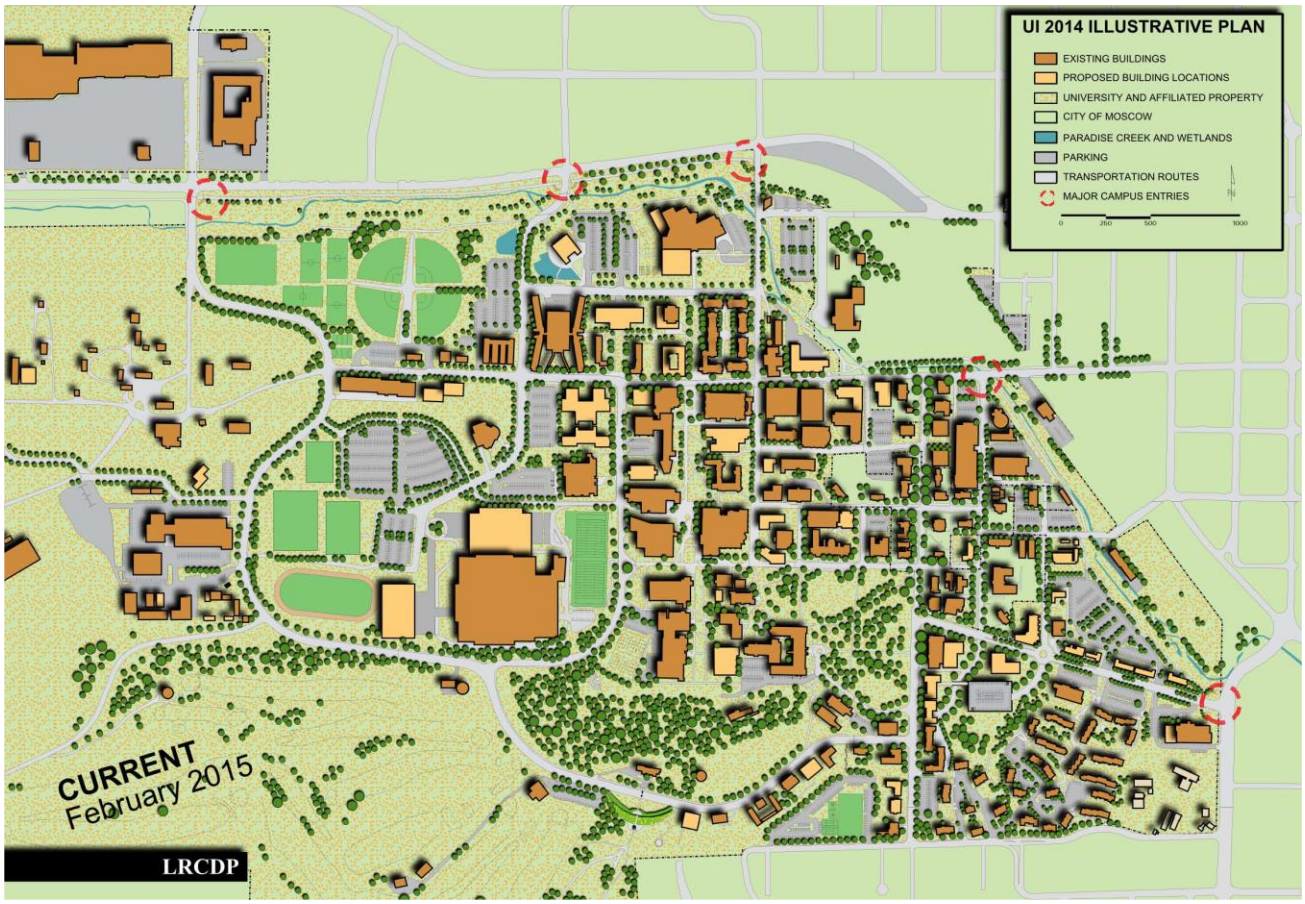


Figure 3. Map of City of Moscow Urban Cluster.

2010 U.S. Census Urban Cluster Reference Map: Moscow, ID available from the U.S. Bureau of the Census: http://www2.census.gov/geo/maps/dc10map/UAUC_RefMap/uc/uc59491_moscow_id/DC10UC59491.pdf

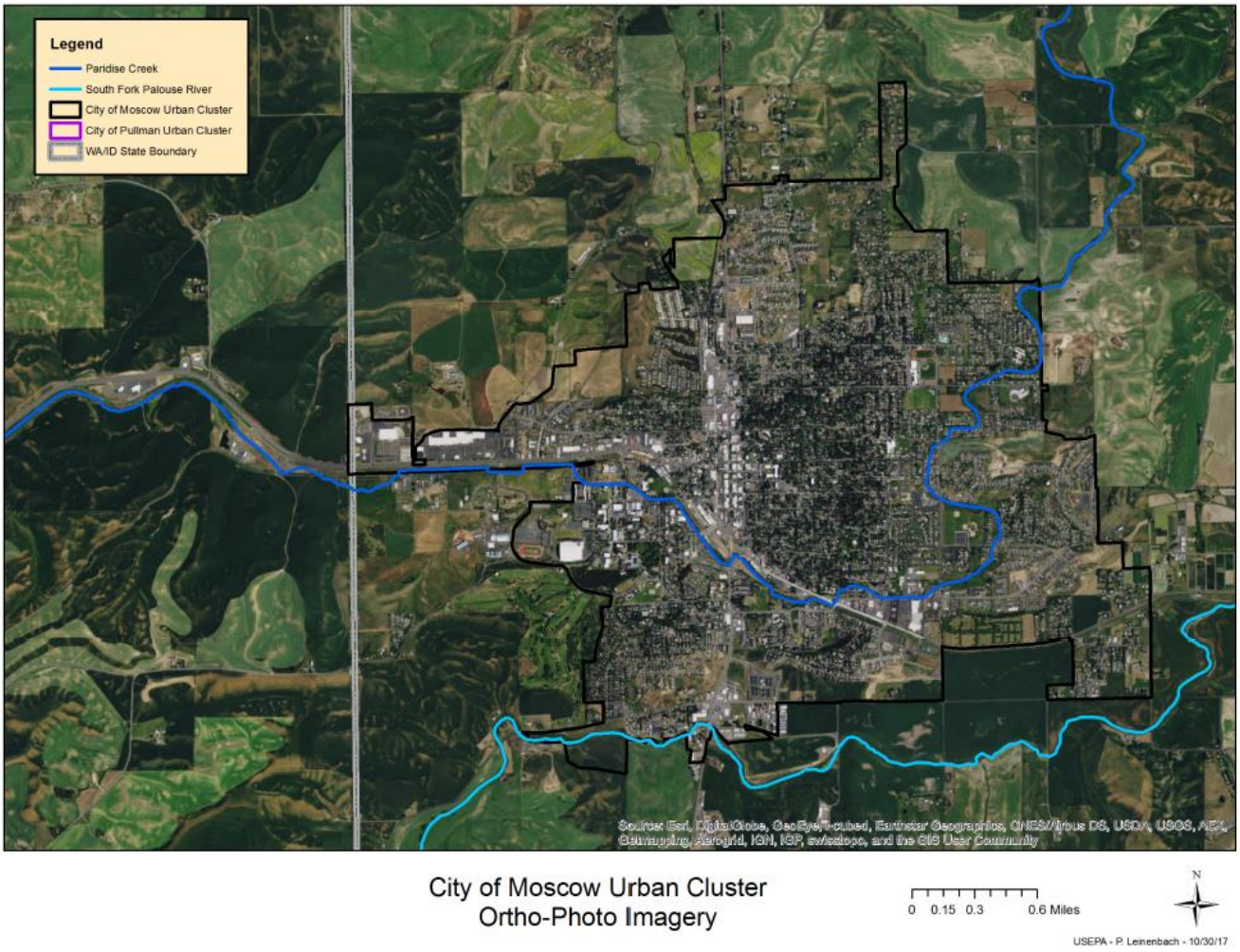
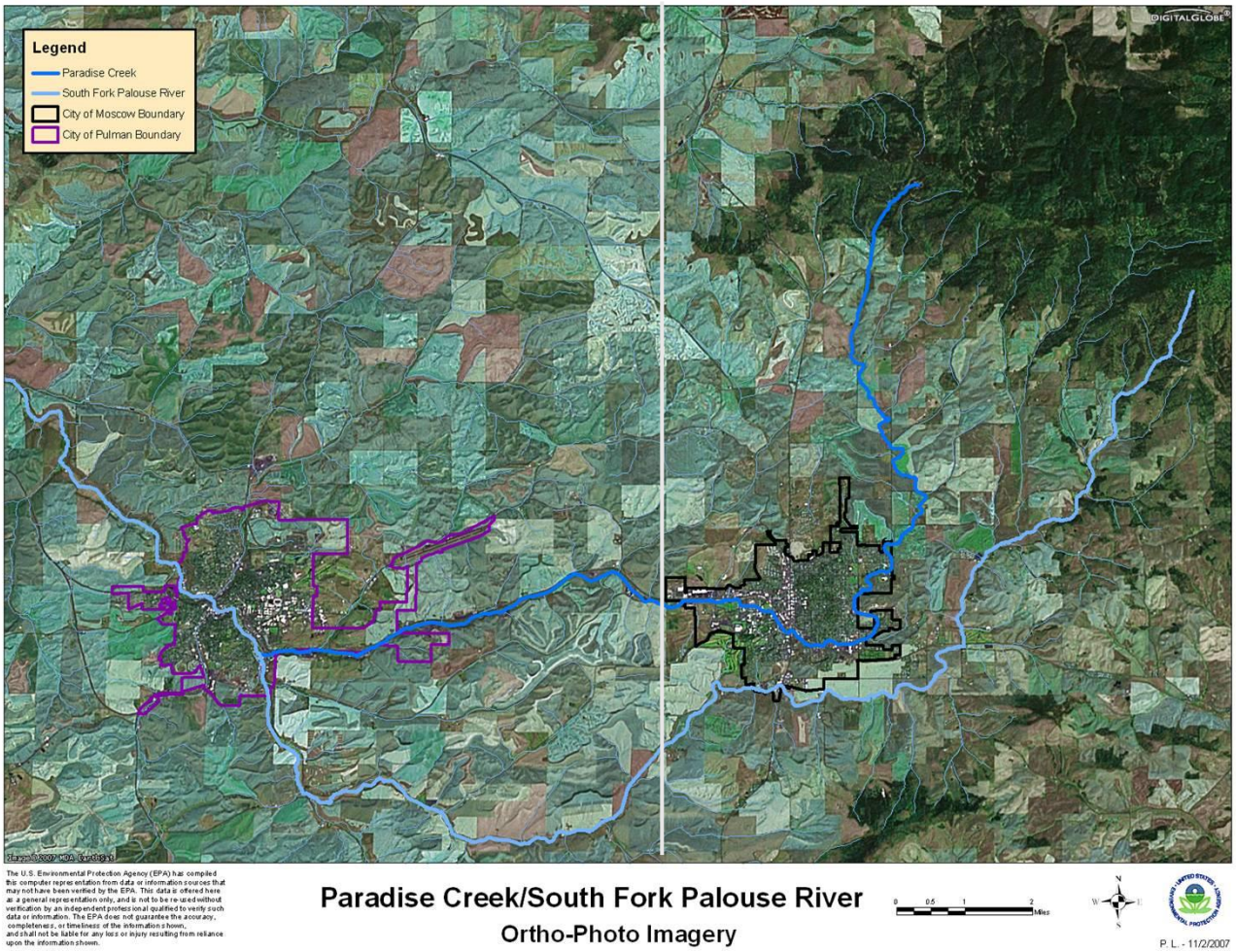


Figure 4. Map of the Paradise Creek/South Fork Palouse River Watershed.

(Sources: EPA 2007 and EPA 2017b.)



IV. Basis for Initial Designation

Background

In early 2007, upon receiving inquiries from representatives of the Washington State University and WDOE, the EPA began its evaluation as to whether MS4s in the Moscow, Idaho area should be designated as "regulated small MS4s" thus requiring a NPDES permit. The EPA began to evaluate whether the discharges contribute to exceedances of water quality standards and/or are significant contributors of pollutants to waters of the U.S. The EPA subsequently notified the University and Moscow of its preliminary determination to designate both MS4s as "regulated small MS4s" under 40 CFR § 122.26(a)(9)(i)(D), based on the criteria listed at 40 CFR § 123.35(b). Later that same year, both the University and Moscow responded by stating that the preliminary designation was unsupported by the available information and data.

WDOE subsequently provided the EPA with additional water quality data collected by WDOE staff from Paradise Creek at the Idaho/Washington border during 2006 and 2007. *See* data summary in Figure Appendix A, Figure A-3 and Table A-4 of this document. Using this and other data collected at the time, in late 2007, WDOE finalized its own designation of Washington State University and the City of Pullman as "regulated small MS4s" and required each of these entities to obtain permit coverage under the *Eastern Washington Phase II Municipal Stormwater General Permit*. Washington State University and the City of Pullman are directly downstream from the University and Moscow. WDOE has continued to encourage the EPA to designate the University and Moscow as "regulated small MS4s," because they contribute to downstream exceedances of Washington State water quality standards in Paradise Creek.

In late 2008, the EPA determined that stormwater discharges from the MS4 owned and/or operated by Moscow contributed to exceedances of the water quality standard for fecal coliform in the State of Washington. The EPA notified Moscow of its initial designation and required Moscow to submit an NPDES permit application no later than September 2009. As part of the application process, the EPA requested that Moscow develop a Storm Water Management Program (SWMP) pursuant to 40 CFR § 122.34.

At the same time, the EPA informally notified the University of its similar intent to designate discharges from the University's MS4 for NPDES permitting because their MS4 discharges contribute to exceedances of the water quality standard for fecal coliform in the State of Washington.[15]

On June 5, 2018, the EPA approved the State of Idaho's application to administer and enforce the Idaho Pollutant Discharge Elimination System (IPDES) program. IDEQ is taking over the IPDES program in phases over a four-year period in accordance with the Memorandum of Agreement (MOA) between IDEQ and the EPA, and subject to EPA oversight and enforcement. IDEQ will obtain permitting authority for the stormwater phase on July 1, 2021.

On November 26, 2018, the EPA proposed to issue a NPDES permit to regulate MS4 discharges from Moscow, and to finalize its determination that Moscow's MS4 discharges contribute to exceedances of applicable water quality standards for Paradise Creek and therefore must be regulated by a NPDES permit when the EPA issues the final permit.

The EPA is now initially designating the University of Idaho's MS4 as a NPDES-regulated small MS4 and is requiring the University to submit a NPDES permit application within 180 days of this initial designation.

15 This informal notification was not an initial designation.

Analysis

In accordance with 40 CFR § 122.26(a)(9)(i)(D), the EPA has discretion to designate stormwater discharges from small MS4s based upon a determination that they contribute to exceedances of water quality standards, including impairment of designated uses, or are significant contributors of pollutants to waters of the U.S., including consideration of habitat and biological impacts, and whether there are sufficient controls to manage such discharges, among other factors. *See also* 33 U.S.C. § 1342(p)(2)(E).

As discussed in detail below, available water quality data and waterbody assessment information indicate that urban storm water discharges from MS4s into Paradise Creek and South Fork Palouse River (1) contribute to exceedances of water quality standards and/or (2) are significant contributors of pollutants to waters of the United States.

The University's MS4 Discharges Contribute to an Exceedance of Water Quality Standards

The University's MS4 discharges to Paradise Creek which is listed in Idaho's 2014 Integrated Report as impaired for ammonia, fecal coliform, *E. coli*, nutrient/eutrophication, biological indicators, sedimentation/siltation and temperature. In addition, WDOE's 303(d) list identifies Paradise Creek at the state line, which is immediately downstream of the University's discharge, as impaired for fecal coliform, ammonia, and nutrients.

Between May 2013 and April 2014, IDEQ conducted instream sampling sufficient to calculate monthly geometric means comparable to the Idaho *E. coli* standard. IDEQ's selected sampling location at Perimeter Drive represents pollutant loading from the urban area after Paradise Creek has passed through Moscow and the University. In addition, instream monitoring for *E.coli* was also conducted upstream of the urban boundary (in AU ID17060108CL005_02a – *forest habitat to urban boundary*). *See* Appendix A, Table A-3. This monitoring data shows that the secondary contact recreation bacteria standard has the *potential* to be exceeded upstream of the urban boundary. In contrast, the data shows that all of IDEQ's calculated monthly geometric means exceeded the 126 cfu/100 mL criterion at the location representing the urban area pollutant load. *See* map monitoring location and monitoring data in Appendix A, Figure A-1 and Table A-1 of this document. Therefore, the instream data shows that the secondary contact recreation bacteria standard is not being met after Paradise Creek passes through the urban area. As a result, through its *Paradise Creek TMDL 2015 Bacteria Addendum*, IDEQ subsequently established a revised load allocation for unregulated nonpoint sources, including urban runoff, equal to the instream water quality target for *E.coli* of 126 cfu/100 ml.[16]

The *Paradise Creek TMDL 2015 Bacteria Addendum* recognizes MS4 discharges as a potential source of pollutants; IDEQ states that MS4 operators must obtain an NPDES permit from the EPA, implement a comprehensive municipal stormwater management program, and use BMPs to control pollutants in stormwater discharges to the maximum extent practicable, in order to prevent harmful pollutants from being washed or dumped into an MS4. IDEQ further clarifies that Paradise Creek is an interstate water, and notes the allocations therein are anticipated to restore Paradise Creek to Idaho's water quality standards in Idaho and to comparable Washington state water quality standards when Paradise Creek crosses the state border and enters Washington.[17] In November 2016, the EPA approved the IDEQ's *Paradise Creek TMDL 2015 Bacteria Addendum.*[18]

[16] See IDEQ 2015, at https://www.deq.idaho.gov/media/60177629/paradise-creek-tmdl-2015-bacteria-addendum.pdf.
[17] Id, pages 6 and 29.
[18] See IDEQ 2015, at pages 9-12, 21, and 24.

IDEQ's data showing that urban stormwater is contributing to a water quality standard exceedance is further confirmed by the data that WDOE provided the EPA. *See* data summary in Figure Appendix A, Figure A-3 and Table A-4 of this document.

Based upon the data provided by WDOE and the information/data set forth in the *Paradise Creek TMDL 2015 Bacteria Addendum*, the EPA concludes that the University's MS4 discharges are contributing to an exceedance of water quality standards in Paradise Creek. Therefore, pursuant to CWA Section 402(p)(2)(E), a NPDES permit is required for these MS4 discharges.

The University's MS4 Discharges are a Significant Contributor of Pollutants to Waters of the U.S.

In addition to concluding that the University's MS4 discharges are contributing to a violation of water quality standards, the EPA is also concluding that the University's MS4 discharges are a significant contributor of pollutants to waters of the U.S. *See* 33 U.S.C. § 1342(p)(2)(E); *see also* 40 CFR § 123.35(b)(1).

In 2002, the EPA Region 10 developed criteria (*see* Table 1) to guide whether unregulated small MS4s should be designated as "regulated small MS4s."[19] These criteria are based on recommendations made in the Phase II rule proposal [63 Fed. Reg. 1562 (January 9, 1998)], and are intended to evaluate whether the MS4 discharges are a significant contributor of pollutants to waters of the U.S. (*i.e.,* whether the discharges cause significant water quality impacts). Notably, these criteria are similar to those considered by the State of Washington to designate additional MS4s outside of urbanized areas. In particular, WDOE used its 2007 Petition Criteria to designate Washington State University and the City of Pullman (located in the same watershed as University of Idaho and City of Moscow). These criteria are also aligned with the IPDES *Designation Criteria and Selection Process for Small Municipal Separate Storm Sewer Systems* (February 2016) that IDEQ will use to designate additional MS4s once IDEQ has obtained storm water permitting authority.[20]

The EPA has used the following criteria as relevant factors to evaluate whether the University's discharges are a significant contributor of pollutants to waters of the U.S. for which designation is warranted.

Table 1. Relevant Factors for Residual Designation of MS4 Discharges

Criterion 1:	Does the municipal separate storm sewer discharge to a sensitive water?
Criterion 2:	Are discharges from the municipal separate storm sewer a significant contributor of pollutants to waters of the United States?
Criterion 3:	Does the municipal separate storm sewer serve a densely populated area?
Criterion 4:	Does the municipal storm sewer serve an area that has experienced high population growth over the last 10 years?
Criterion 5:	Is the municipal separate storm sewer contiguously located to an Urbanized Area or to an already regulated municipal storm sewer?
Criterion 6:	Is the municipal separate storm sewer physically interconnected to another, already regulated municipal storm sewer?
Criterion 7:	Are the water quality impacts of the municipal separate storm sewer already being addressed under other regulations or programs?

[19] U.S. EPA, *EPA Region 10's Designation Criteria for Small Municipal Separate Storm Sewer Systems*. June 2002. See also 40 CFR § 123.35(b)

[20] This IDEQ document is available online at: https://www.deq.idaho.gov/media/60178031/ipdes-designation-criteria-selection-process-small-municipal-separate-storm-sewer-systems-0216.pdf

Criterion 1: Does the Municipal Separate Storm Sewer Discharge to a Sensitive Water?

"Sensitive waters" include public drinking water intakes and their designated protection areas; designated public swimming beaches; State-designated Outstanding Resource Waters; waters within Federal, State and local parks; and waters containing threatened or endangered species and their habitat.[21]

> **Conclusion:** The University's MS4 discharges stormwater directly and indirectly into Paradise Creek, an interstate water body that is considered by both the States of Idaho and Washington as not meeting the applicable state water quality standards. Paradise Creek is not considered a "sensitive water" pursuant to the definition outlined above.

Criterion 2: Are discharges from the municipal separate storm sewer a significant contributor of pollutants to waters of the United States?

IDEQ's 2014 Integrated Report lists the segment of Paradise Creek that flows through the University, Assessment Unit ID 17060108CL005_02 from the eastern urban boundary to Idaho/Washington border, to be impaired for ammonia, fecal coliform, E. coli, nutrient/eutrophication, biological indicators, sedimentation/siltation and temperature. In addition, WDOE's 303(d) list cites the portion of Paradise Creek in Washington State as being impaired for fecal coliform, ammonia, and nutrients. Paradise Creek is a tributary of the South Fork of the Palouse River, which WDOE also lists as impaired for fecal coliform, dissolved oxygen, temperature, and polychlorinated biphenyls (PCBs). [22, 23]

Refer to Figure 4, above, for a map of the Paradise Creek/South Fork Palouse River watershed.
The EPA Region 10 approved the TMDLs for Paradise Creek in both states.[24] Each of the TMDL documents state that operators of MS4s within the Paradise Creek/South Fork Palouse River watershed must actively reduce pollutants discharged through the MS4s to meet the pollutant reduction targets determined necessary to attain the applicable water quality standard(s).

> **Conclusion:**. The University of Idaho discharges stormwater through its MS4 directly and indirectly, via its physical interconnection to the Moscow MS4, to Paradise Creek. Paradise Creek is subject to

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[21] See EPA 1998; IDEQ 2016.

[22] IDEQ previously listed Paradise Creek as impaired for fecal coliform; *E. coli* is currently listed as the impairment due to a change in Idaho's water quality standards regarding secondary contact recreation criteria from a criterion associated with fecal coliform to a more specific criterion for *E. coli*. Note that Paradise Creek and South Fork Palouse River have been listed as impaired by IDEQ in its 1994, 2002, 2010, and 2012 Integrated Reports. Also note that IDEQ considers the Idaho portion of the South Fork Palouse Assessment Unit ID 17060108CL002_03, to be impaired for sediment, nutrients, bacteria and temperature.

[23] The IDEQ's 2014 Integrated Report is available online at: https://www.deq.idaho.gov/assistance-resources/maps-data/. All applicable Idaho TMDL documents are available on IDEQ's website at http://deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls/

See also the WDOE 2015 Water Quality Assessment 305(b) Report and 303(d) list, http://www.ecy.wa.gov/programs/wq/303d/index.html; Paradise Creek and South Fork Palouse River were also listed as impaired in WDOE's 2004 CWA Section 303(d) report, http://www.ecy.wa.gov/programs/wq/303d/2002/2002-index.html

[24] Specifically, these EPA-approved TMDLs in Idaho are *Paradise Creek TMDL: Waterbody Assessment and Total Maximum Daily Load,* IDEQ, December 1997; and *Paradise Creek Total Maximum Daily Load Implementation Plan*, IDEQ, December 1999; *Paradise Creek TMDL 2015 Bacteria Addendum Hydrologic Unit Code 17060108*, IDEQ, October 2015; and, in Washington, S*outh Fork Palouse River Fecal Coliform Bacteria Total Maximum Daily Load - Water Quality Improvement Repor*t, WDOE Publication No. 09-10-060, October 2009.

EPA-approved TMDLs. Each of the Paradise Creek TMDLs identify urban stormwater from MS4 discharges as sources of pollutants of concern to Paradise Creek. Thus, based on the statements in the applicable TMDLs for Paradise Creek, the EPA finds that the University's discharge is a significant contributor of pollutants to waters of the U.S.

Criteria 3 and 4: Does the municipal separate storm sewer serve a densely populated area? Does the municipal storm sewer serve an area that has experienced high population growth over the last 10 years?

Population density is related to the level of human activity and has been shown to be directly linked to total impervious land surfaces; impervious surfaces are directly related to pollutant loadings from storm water runoff.[25]

The University's campus supports approximately 9,430 enrolled students and approximately 6,000 employees.[26] Using these approximate population numbers, the EPA concludes that the MS4 serves a population of 10,000 or more outside of an Urbanized Area. The EPA estimates the population density of this residential and commuter/employee population is 642 people per square mile. As discussed below, the University's MS4 is physically interconnected with the City of Moscow's MS4.

At this broader scale, Moscow is the 12th largest city in Idaho. The population of Moscow grew from 21,291 in Year 2000 to 23,800 in Year 2010, representing a 11.78 % increase over ten years. The population of the Moscow, Idaho Urban Cluster area similarly increased from 21,791 to 24,212, or approximately 11.1%, between Years 2000-2010. The City's population density was recorded by the Year 2010 Census as 3,473 persons per square mile. Between 2010 and 2015, Moscow population continued to increase 5.3% to 25,060 people..[27] Further, the EPA's analysis of images from the 2011 National Landcover Dataset, in Appendix B of this document, illustrates that the average percent of impervious developed surface area within the City of Moscow urban cluster is approximately 33.6%. This average is slightly greater than the impervious developed surface area estimated for the City of Pullman urban cluster (31%), which was designated by Washington in 2007 as a regulated small MS4. In the five-year period between 2006 and 2011, impervious surface areas increased by 7% and 8%, respectively, in the Moscow and Pullman Urban Clusters.[28]

Conclusion: The University's MS4 serves a combined residential and commuter population of 15,430. In addition, increasing population within the greater Moscow area, within the Paradise Creek watershed, combined with the increasing amount of impervious surfaces that accompanies such population growth, are strong indicators of significant pollutant loading from urban stormwater discharges through the University's MS4 discharges to Paradise Creek.

Criterion 5: Is the MS4 contiguously located to an Urbanized Area or to an already regulated

[25] EPA 1998 at page 1562; IDEQ 2016.

[26] Year 2018 estimates, available at *University of Idaho Fast Facts*, https://www.uidaho.edu/about/fast-facts

[27] U.S. Census 2010; U.S. Census 2012.

[28] See: EPA 2017b in Appendix B of this document, and Multi-Resolution Land Characteristics (MRLC) Consortium, http://www.mrlc.gov/.

municipal storm sewer?

As previously noted, the University's MS4 drains an area located in Moscow. See Figure 1.

In November 2018, the EPA proposed to finalize its designation of Moscow as a regulated small MS4 and proposed the NPDES permit in response to the Moscow's MS4 permit application. The EPA will respond to public comment and intends to finalize its designation decision when it issues a final NPDES permit for the City's MS4 discharges. Upon issuance of the MS4 permit for City of Moscow, the University's MS4 will be considered contiguously located to a regulated small MS4. [29]

> **Conclusion:** The University's MS4 is not contiguously located to an Urbanized Area at the current time. Upon the EPA's action to issue a final permit to Moscow (and finalizes the associated designation as a regulated MS4), the University would be contiguously located to a regulated MS4.

Criterion 6: Is the municipal separate storm sewer physically interconnected to another, already regulated municipal storm sewer?

> **Conclusion:** The University's MS4 is identified by maps provided by the City as being physically interconnected to Moscow's MS4 at several locations.[30]When the City of Moscow designation and MS4 permit are finalized, the University's MS4 will be considered physically interconnected to a regulated small MS4.

Criterion 7: Are the water quality impacts of the University of Idaho's MS4 already being addressed under other regulations or programs?

The University of Idaho is not currently addressing water quality impacts from the MS4 in a sufficient manner such that the discharges do not contribute to exceedances of applicable water quality standards or are not a significant contributor of pollutants to waters of the United States.

As a result of the IDEQ's 1997 TMDL for Paradise Creek, both the City of Moscow and the University invested in specific water quality and flow improvement actions designed to reduce pollutant loading to the section of Paradise Creek in the Moscow City limits; these actions were outlined in the 1999 TMDL Implementation Plan. These prior actions included capital improvements designed to reduce pollutant loading from the storm sewer system; and enhanced attention to storm sewer system maintenance. The EPA Region 10 commends the University for these prior actions, which form a foundation for ongoing and comprehensive storm water management. The EPA Region 10 also notes that the 1999 TMDL Implementation Plan, Appendix C, contemplates that both the University and the City will obtain a NPDES permit and implement BMPs as part of their Storm Water Management Programs.

However, the EPA is unaware of any comprehensive or ongoing stormwater management activities being routinely conducted by the University. In light of the most recent water quality monitoring by IDEQ showing that *E. coli* levels in Paradise Creek continue to exceed the applicable Idaho water quality standard, the EPA Region 10 does not consider prior actions by the University to adequately or sufficiently constitute a

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[29] It is also worth noting that the University's MS4 is substantially similar with regard to drainage infrastructure and land use to its downstream neighbor, Washington State University. As noted earlier, both the City of Pullman and Washington State University were designated by WDOE as regulated small MS4s that are subject to WDOE's Eastern Washington Municipal Stormwater Permit.

[30] See: Moscow 2009. See also: EPA 1999 at page 68745: "To be ''physically interconnected,'' the MS4 of one entity, including roads with drainage systems and municipal streets, is physically connected directly to the municipal separate storm sewer of another entity."

dedicated, routine, and comprehensive Storm Water Management Program, which is what the University would have to develop under a small MS4 NPDES permit. Such a program would provide for the regular and ongoing capacity necessary to maintain the MS4 infrastructure and mitigate pollutant sources in order to protect water quality over the long term.

To reduce pollutants of concern in stormwater discharged through the University's MS4, it is both necessary and important that the University work in concert with the City of Moscow to ensure that the following stormwater-specific control measures are part of an ongoing Storm Water Management Program: public education; public involvement; illicit discharge detection and elimination; construction site runoff control; post construction storm water management; and pollution prevention /good housekeeping associated with municipal/University operations.

Ongoing implementation of such a program, as required under a NPDES permit, would reduce sources of bacteria (in the form *E. coli*, and fecal coliform) and other associated pollutants discharged through the University's MS4 in Paradise Creek/South Fork Palouse River watershed, and fulfill the expectations of the Paradise Creek TMDLs developed by both IDEQ and WDOE. Ongoing implementation of such a program is should result in the discharges no longer contributing to exceedances of applicable water quality standards, and no longer being significant contributors of pollutants to waters of the United States.

Conclusion

Based upon the discussion/analysis above, the EPA concludes that the University's MS4 discharges (1) contribute to an exceedance of both Idaho and Washington state water quality standards and (2) are a significant contributor of pollutants to waters of the U.S.

As a result, the University must submit a NPDES permit application for a MS4 permit within 180 days of notification. Upon receiving the permit application, the EPA will then propose a draft permit for public comment. The draft permit will include permit provisions similar to other small MS4 permits in Idaho that address the six minimum control measures, per 40 CFR § 122.34(a) and (b). In addition, the permit will likely stipulate special provisions to address sources of bacterial pollution, as well as monitoring requirements to identify specific sources of pollutants of concern, per 40 CFR § 122.34(a) and (c). The question of whether the initial designation was proper will remain open for consideration during the public comment period and in any subsequent public hearing.

Appendix A: Monitoring Data

Figure A-1. Approximate location of IDEQ's Paradise Creek Monitoring Site at Perimeter Drive, representing the waterbody segments AU ID17060108CL005_02, ID17060108CL005_02a. and ID17060108CL005_02b.

According to the IDEQ's 2015 *Paradise Creek TMDL Bacteria Addendum*,[31] at page 24:

> "The site is at the intersection of Paradise Creek with Perimeter Drive in Moscow, Idaho, located in AU ID17060108CL005_02 at latitude 46.73194 and longitude -117.02479, downstream from the Paradise Creek USGS gage station…. This site is an urbanized area after the creek has passed through the City of Moscow and the University of Idaho campus. The monitoring site characterizes the three AUs at a single discharge point and was sampled from May 2013 through April 2014."

(***Map Source: IDEQ 2015, Page 25.)***

[31] See IDEQ 2015.

Table A-2. IDEQ Monitoring Data from the Perimeter Drive location

Source: IDEQ 2015. Paradise Creek TMDL Bacteria Addendum, Appendix B.

Note: The Idaho water quality standard for *E. coli* is a geometric mean of one hundred twenty-six (126) *E. coli* organisms cfu/100 mL, based on a minimum of five (5) samples taken every three (3) to seven (7) days over a thirty (30) day period.

Paradise Creek *E. coli* data, AU ID17060108CL005_02.

Date	Sample Results (cfu/100 mL)	Continuous Geometric Mean (cfu/100 mL)	Monthly Geometric Mean (cfu/100 mL)	Discharge (cfs)
5/02/2013	263.5			4.4
5/09/2013	529			2.7
5/16/2013	189.1			1.9
5/22/2013	>2419.2			1.8
5/28/2013	>2419.2	688.1	**688.1**	2.0
6/03/2013	517.95	787.7		2.0
6/06/2013	>2419.2	1067.6		0.72
6/11/2013	328.15	1192.0		0.72
6/17/2013	>2419.2	1192.0		0.36
6/24/2013	>2419.2	1192.0	**1192.0**	8.2
7/01/2013	246.15	1027.2		0.64
7/10/2013	479.05	743.0		0.22
7/17/2013	>2419.2	1107.9		0.36
7/24/2013	548.3	823.4		0.14
7/29/2013	923.4	679.1		0.14
8/06/2013	394.7	746.4		0.31
8/12/2013	290.9	675.5		0.14
8/21/2013	264.6	433.9		0.14
8/26/2013	>2419.2	583.9		0.56
8/29/2013	307.6	468.7		0.14
9/04/2013	156.8	389.6		0.22
9/09/2013	875.3	485.7	**485.7**	0.49
9/17/2013	426.9	534.4		0.26
9/23/2013	728.4	420.4		1.6
9/30/2013	697.9	495.2		13
10/03/2013	89.7	442.9		0.56
10/09/2013	411	380.7		1.0
10/15/2013	237.8	338.7		0.22
10/22/2013	751.6	340.8		0.18
10/28/2013	>2419.2	437.0	**437.0**	0.22
11/04/2013	638.8	647.2		1.3
11/07/2013	431	653.3		3.1
11/13/2013	44.7	467.7		0.26
11/19/2013	>2419.2	590.9		3.9
11/25/2013	13.5	209.3	**209.3**	0.42
12/02/2013	>2419.2	273.2		4.1

Table A-2, continued.

Date	Sample Results (cfu/100 mL)	Continuous Geometric Mean (cfu/100 mL)	Monthly Geometric Mean (cfu/100 mL)	Discharge (cfs)
12/05/2013	291.5	252.7		0.72
12/11/2013	>2419.2	561.3		0.26
12/18/2013	816.4	451.7		0.42
12/23/2013	214.2	785.1	**785.1**	5.6
1/02/2014	24.6	313.6		1.9
1/08/2014	1179.2	414.7		1.2
1/15/2014	77.7	208.5		2.4
1/22/2014	378.9	178.8		1.0
1/29/2014	376.4	200.2	**200.2**	2.2
2/03/2014	197	303.5		1.6
2/10/2014	36	151.0		1.1
2/13/2014	579.4	225.7		48
2/19/2014	248.9	207.5		26
2/26/2014	130.4	167.9	**167.9**	12
3/06/2014	160.3	161.1		46
3/10/2014	97.7	196.7		41
3/13/2014	535.9	193.7		16
3/19/2014	64.7	147.9		11
3/25/2014	137.8	149.6	**149.6**	5.3
4/03/2014	62.1	123.7		4.4
4/09/2014	1209.8	204.6		5.6
4/15/2014	100.9	146.5		3.4
4/21/2014	179.5	179.7		N/A
4/28/2014	159.5	185.1	**185.1**	3.4

Notes: milliliter (mL); colony-forming unit (cfu); cubic foot per second (cfs)

Table A-3: IDEQ Additional monitoring data collected upstream of Perimeter Drive location

Source: *IDEQ 2015. Paradise Creek TMDL Bacteria Addendum, Appendix C.*

Additional October 2014 Monitoring Data

Site Name	10/1/14	10/7/14	10/14/14	10/20/14	10/23/14	Monthly Geometric Mean (cfu/100 mL)
Darby Road	11	1	3	1	1	2.0
Mountain View Park	218.7	5.8	1	1	108.1	10.7
Heron's Hideout Park	275.5	27.5	93.9	613.1	24.6	101.4
Perimeter Drive	1203.3	39.3	114.5	32.3	1413.6	189.9

Note: colony-forming unit per 100 milliliters (cfu/100 mL)

Figure A-3. Approximate location of WDOE's monitoring stations near City of Moscow to assess fecal coliform bacteria in support of the WDOE 2009 *South Fork Palouse River Fecal Coliform Bacteria TMDL.*

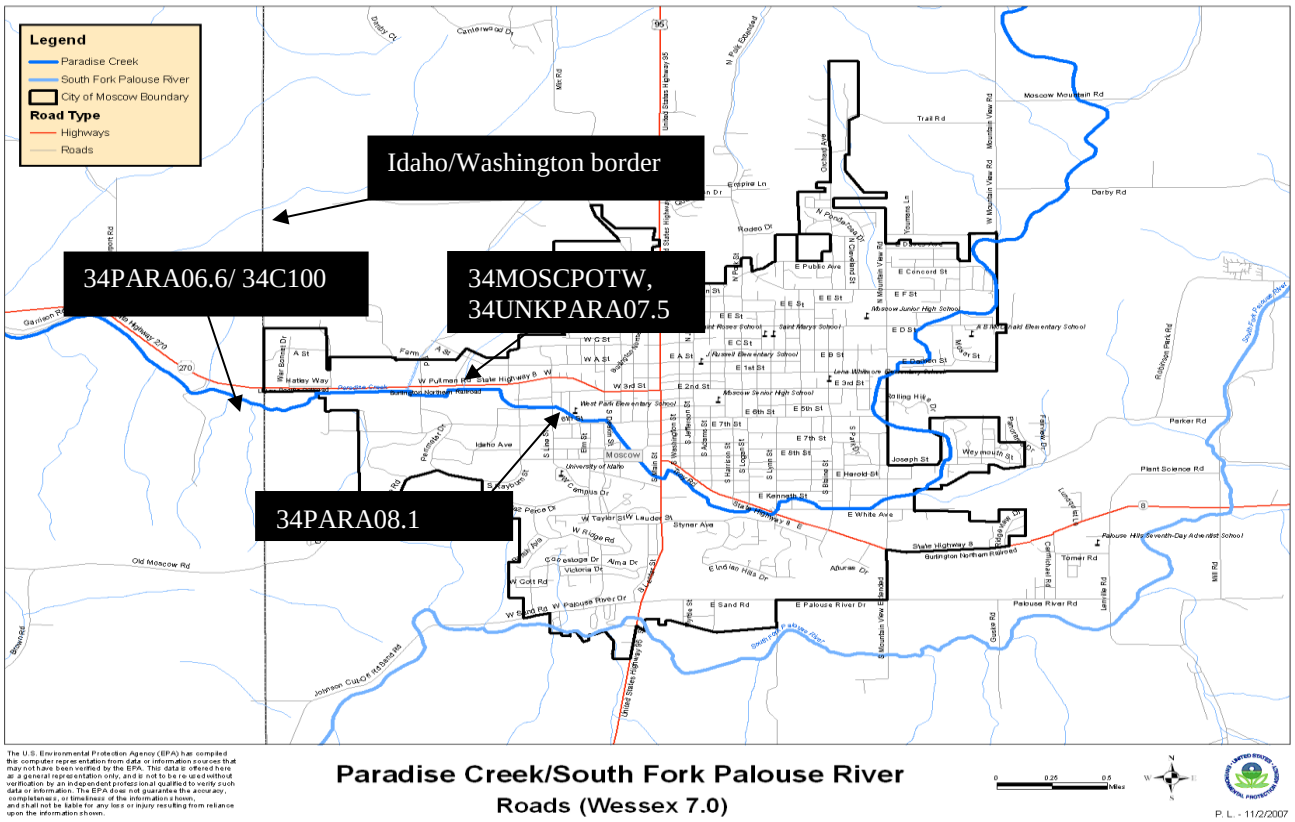

Table A-4. WDOE Monitoring Data

Data collected by WDOE in 2006-2007 to assess fecal coliform bacteria in support of the South Fork Palouse River Fecal Coliform Bacteria TMDL.

Source: WDOE 2009. SF Palouse Fecal Coliform Bacteria TMDL, pages 47 – 49.

Note: Washington's fecal coliform standard is 100 colony forming units per 100 milliliters of solution (cfu/100 mL) geometric mean, and upper 10 percentile of samples < 200 cfu/100mL. Relevant monitoring locations are highlighted in yellow, and results exceeding the WA standard are highlighted in pink.

Table 16. Dry-season and wet-season summary statistics of bacteria counts and target percent reductions for stations in Paradise Creek.

Station ID	Total # of Samples	Mini-mum	10th percen-tile	Geomean*	90th percen-tile	Maxi-mum	% Samples >200 cfu / 100 mL *	Target % Reduction**
Dry Season								
34Para08.1	11	84	64	508	4038	7500	64%	**95%**
34MoscPOTW	7	3	2.4	29	351	640	14%	**43%**
34UnkPara(07.5)	0	----	----	----	----	----	----	**----**
34Para06.6	13	20	45	324	2321	5700	69%	**91%**
34UnkPara(06.3)	1	3	----	----	----	3	----	**0%**
34Para03.8	11	11	29	194	1276	2800	64%	**84%**
34Air00.0	7	1	4.6	115	2908	1700	43%	**93%**
34Para01.1	6	9	5.6	66	777	1800	17%	**74%**
34ParaWSU3	5	1	0.4	3	29	44	0%	**0%**
34Para00.1	12	4	6.1	55	492	1700	17%	**59%**
Wet Season								
34Para08.1	13	3	20	98	488	445	23%	**59%**
34MoscPOTW	11	1	1	4	14	24	0%	**0%**
34UnkPara(07.5)	8	3	7	90	1164	800	63%	**83%**
34Para06.6	15	24	18	156	1350	4400	27%	**85%**
34UnkPara(06.3)	9	1	0	7	151	640	11%	**0%**
34Para03.8	12	4	4	36	326	460	17%	**39%**
34Air00.0	12	9	9	106	1282	4500	50%	**84%**
34Para01.1	11	6	4	34	324	480	18%	**38%**
34ParaWSU3	11	1	0	4	82	460	9%	**0%**
34Para00.1	14	3	3	32	320	930	14%	**37%**

*Cells shaded in these columns are values that exceed Washington State numeric standards.

**Cells shaded in this column are values based on less than 5 samples collected at that station.

Appendix B: Impervious Surface Conditions in Pullman/Moscow Paradise Creek Region

Memorandum October 31, 2017

To: Misha Vakoc, USEPA

From: Peter Leinenbach, USEPA

Subject: Imperious surface conditions in the Pullman/Moscow Paradise Creek Region

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Findings –

Sampling of the 2011 NLCD Dataset showed that:

1. Eighty-four percent (84%) of the land surface within the city of Moscow Urban Cluster boundary is classified in the "developed" category in the 2011 National Landcover Dataset.

2. The weighted average imperviousness of landcover within the city of Moscow Urban Cluster boundary is 33.6% within the 2011 NLCD Percent Developed Imperviousness dataset

3. Impervious developed surface conditions are similar between the city of Moscow and the city of Pullman urban cluster zones.

4. Impervious developed surface area extent has increased within the city of Moscow urban cluster zone during the 2006 to 2011 period.

Datasets -

National Landcover Dataset – NLCD 2011 Percent Developed Imperviousness (https://www.mrlc.gov/nlcd11_data.php)

National Landcover Dataset – NLCD 2006 to 2011 Percent Developed Imperviousness (https://www.mrlc.gov/nlcd11_data.php)

National Landcover Dataset – NLCD 2011 Landcover (https://www.mrlc.gov/nlcd11_data.php)

Moscow and Pullman Urban Cluster Boundaries – 2017 Urban Boundaries dataset (https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2017&layergroup=Urban+Areas)

Methods –

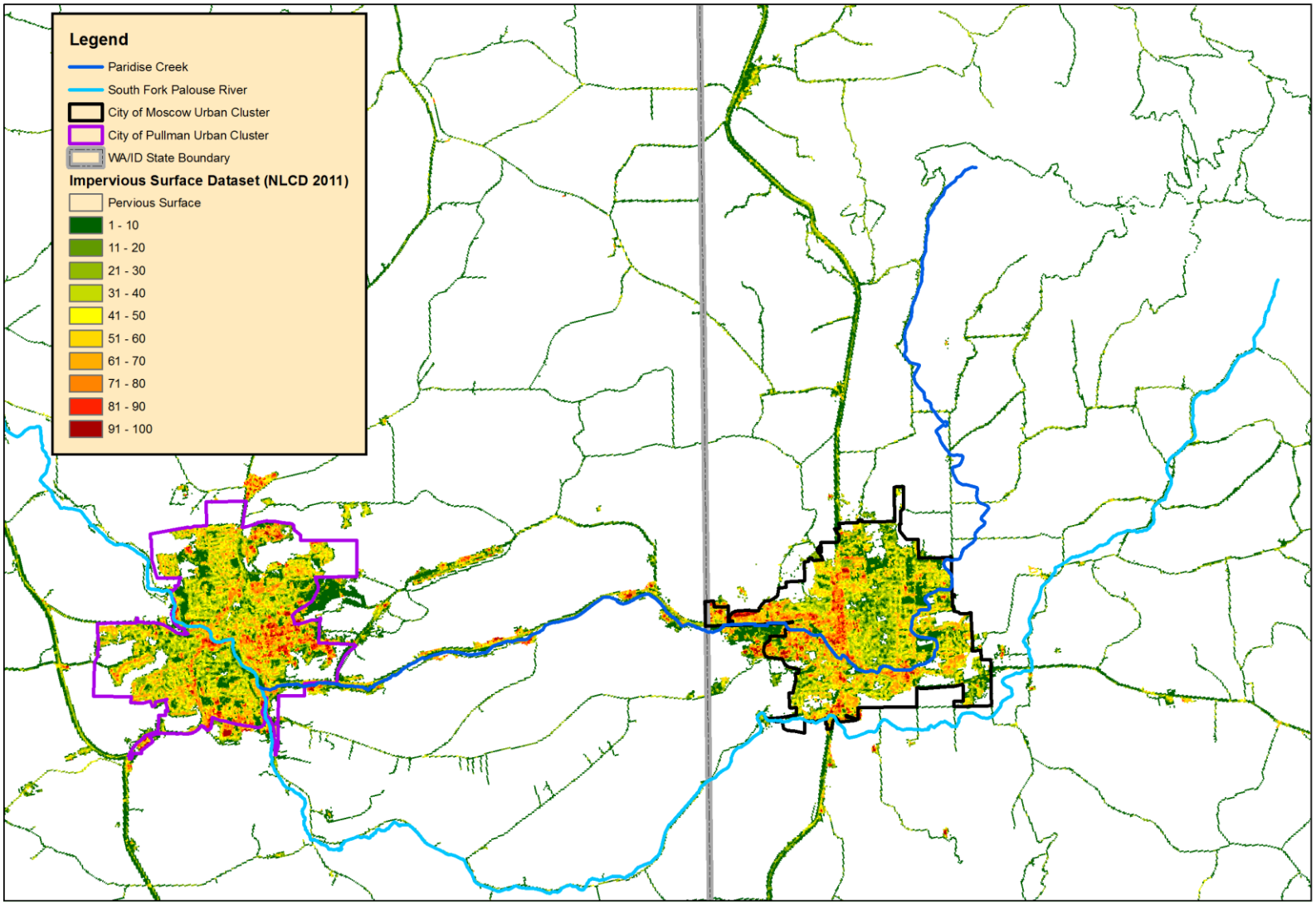
The Zonal Histogram tool in ArcGIS was used to sample the landcover grid datasets by two city cluster polygons.

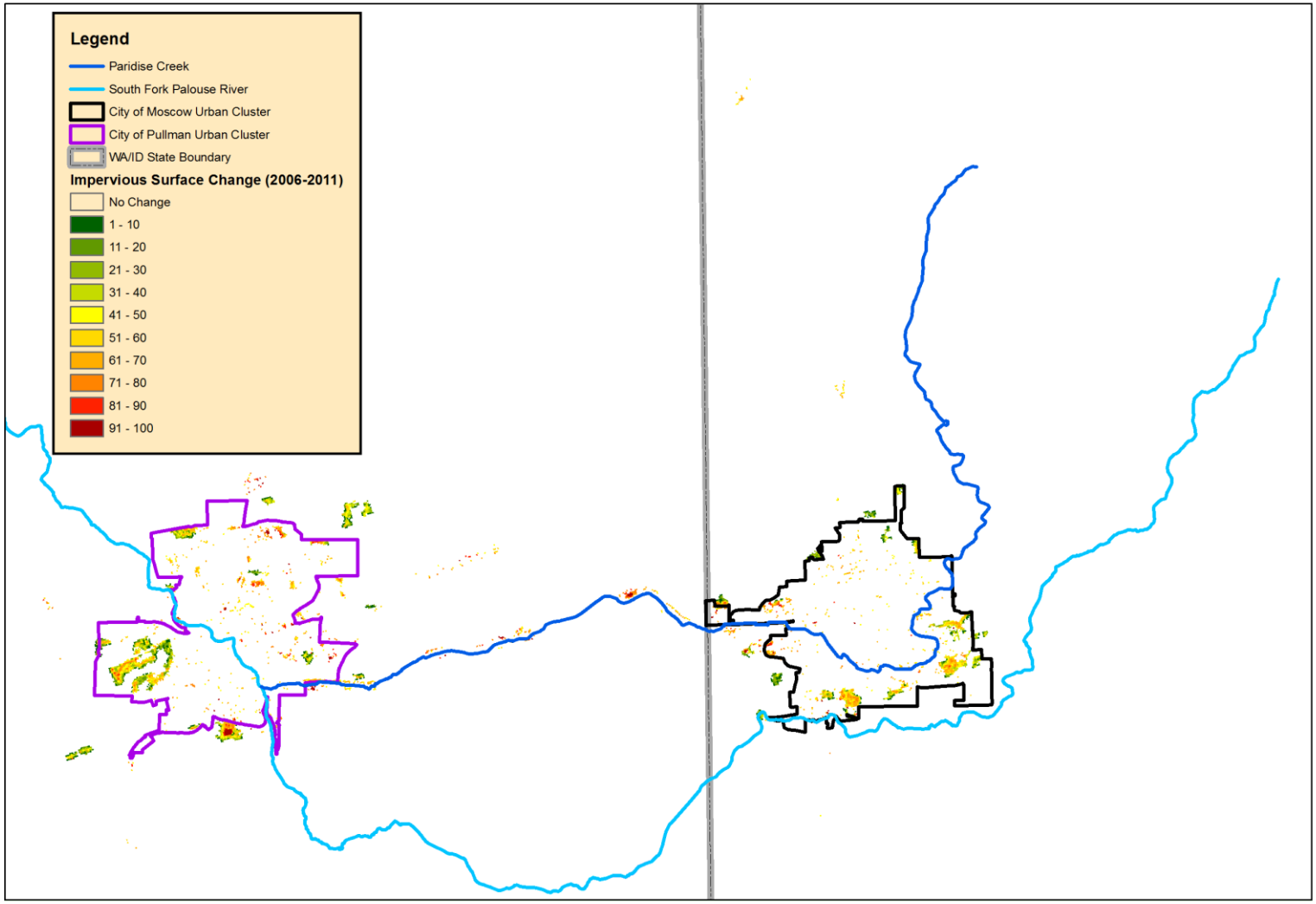
Results –

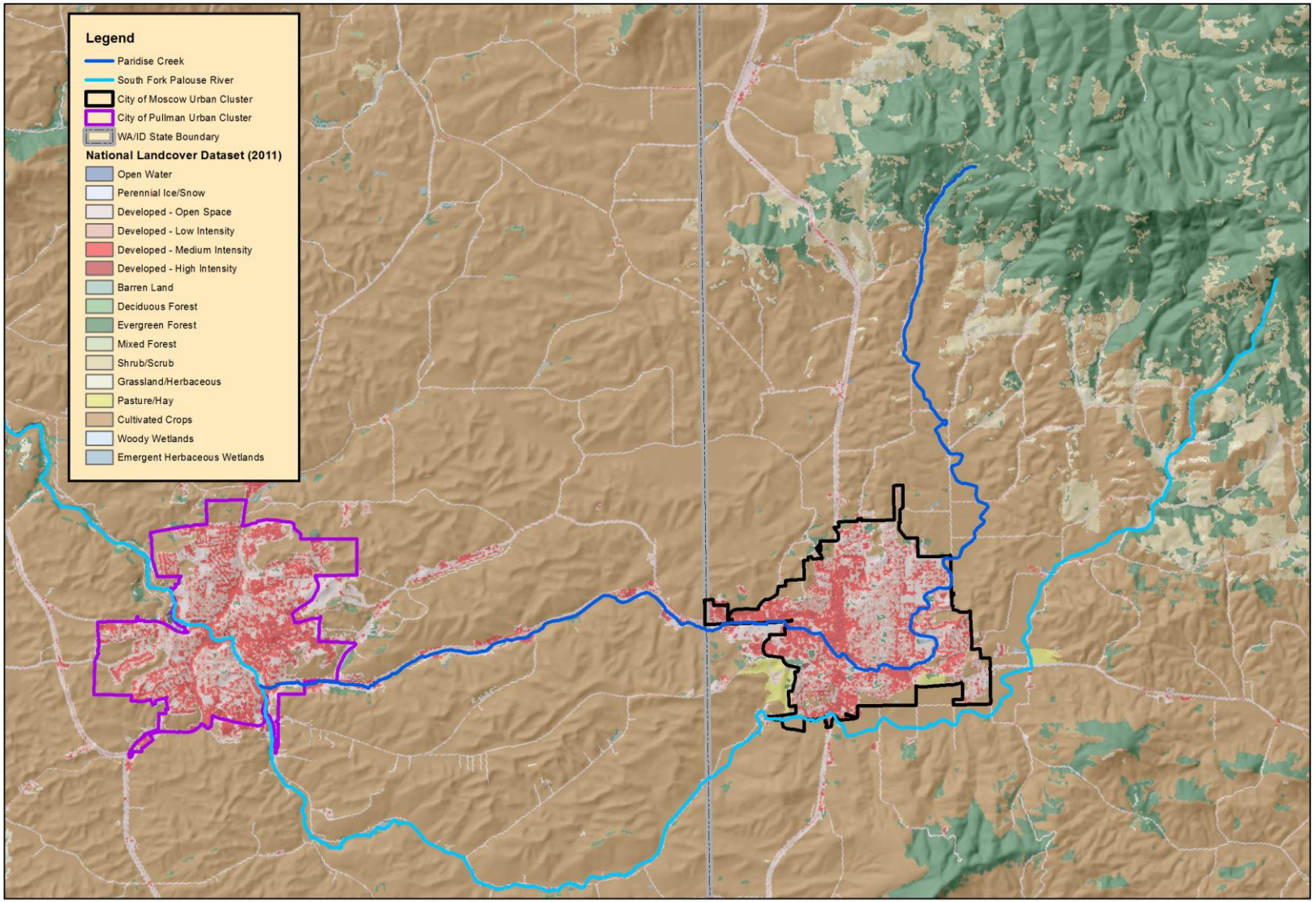
Landcover (NLCD 2011)	Relative Percent within the Moscow Urban Cluster	Relative Percent within the Pullman Urban Cluster
Open Water	< 1%	< 1%
Developed - Open Space	21%	19%
Developed - Low Intensity	32%	29%
Developed - Medium Intensity	27%	26%
Developed - High Intensity	4%	4%
Barren Land	< 1%	< 1%
Deciduous Forest	< 1%	< 1%
Evergreen Forest	2%	< 1%
Mixed Forest	< 1%	< 1%
Shrub/Scrub	< 1%	< 1%
Grassland/Herbaceous	< 1%	< 1%
Pasture/Hay	1%	< 1%
Cultivated Crops	13%	21%
Woody Wetlands	< 1%	< 1%
Emergent Herbaceous Wetlands	< 1%	< 1%

Percent Imperviousness (NLCD 2011)	Within the Moscow Urban Cluster	Within the Pullman Urban Cluster
Weighted Average Imperviousness for All Areas within the Urban Cluster	34%	31%
Weighted Average Imperviousness for Developed Areas within the Urban Cluster	40%	40%

Percent Imperviousness Change from 2006 to 2011 (NLCD 2011)	Within the Moscow Urban Cluster	Within the Pullman Urban Cluster
Percent area with impervious area increase within the Urban Cluster Boundary	7%	8%


Legend
Paridise Creek
South Fork Palouse River
City of Moscow Urban Cluster
City of Pullman Urban Cluster
WA/ID State Boundary
Impervious Surface Dataset (NLCD 2011)
Pervious Surface
1 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Paradise Creek/South Fork Palouse River
Impervious Surface Dataset (2011)
0 0.5 1 2 Miles
N
USEPA - P. Leinenbach - 10/30/17


Legend
Paridise Creek
South Fork Palouse River
City of Moscow Urban Cluster
City of Pullman Urban Cluster
WA/ID State Boundary
Impervious Surface Change (2006-2011)
No Change
1 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
Paradise Creek/South Fork Palouse River
Impervious Surface Change Dataset (2006 to 2011)
0 0.5 1 2 Miles
N
USEPA - P. Leinenbach - 10/30/17



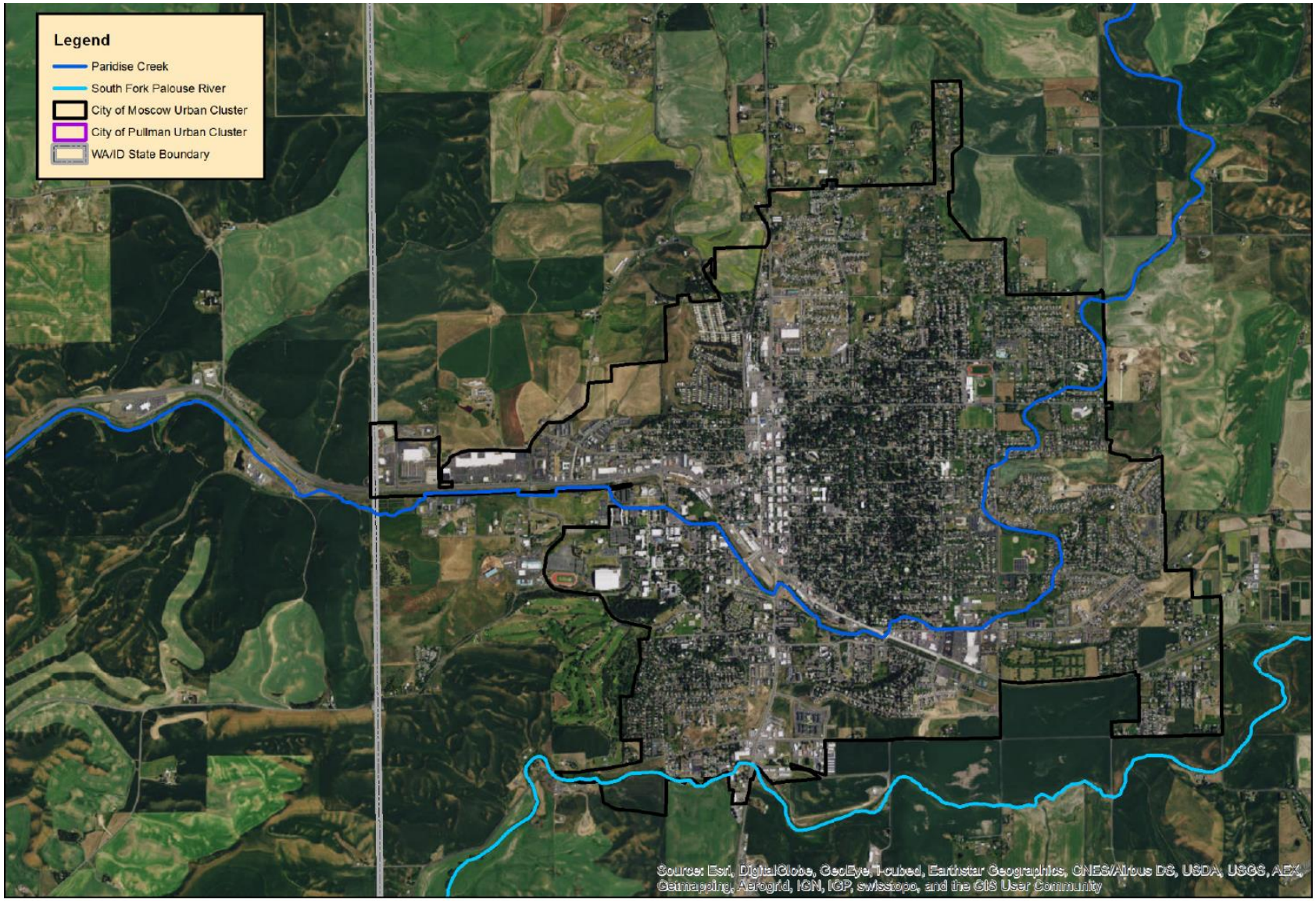
Paradise Creek/South Fork Palouse River
National Landcover Dataset (2011)

0 0.5 1 2 Miles

N

USEPA - P. Leinenbach - 10/30/17

0.6 Miles

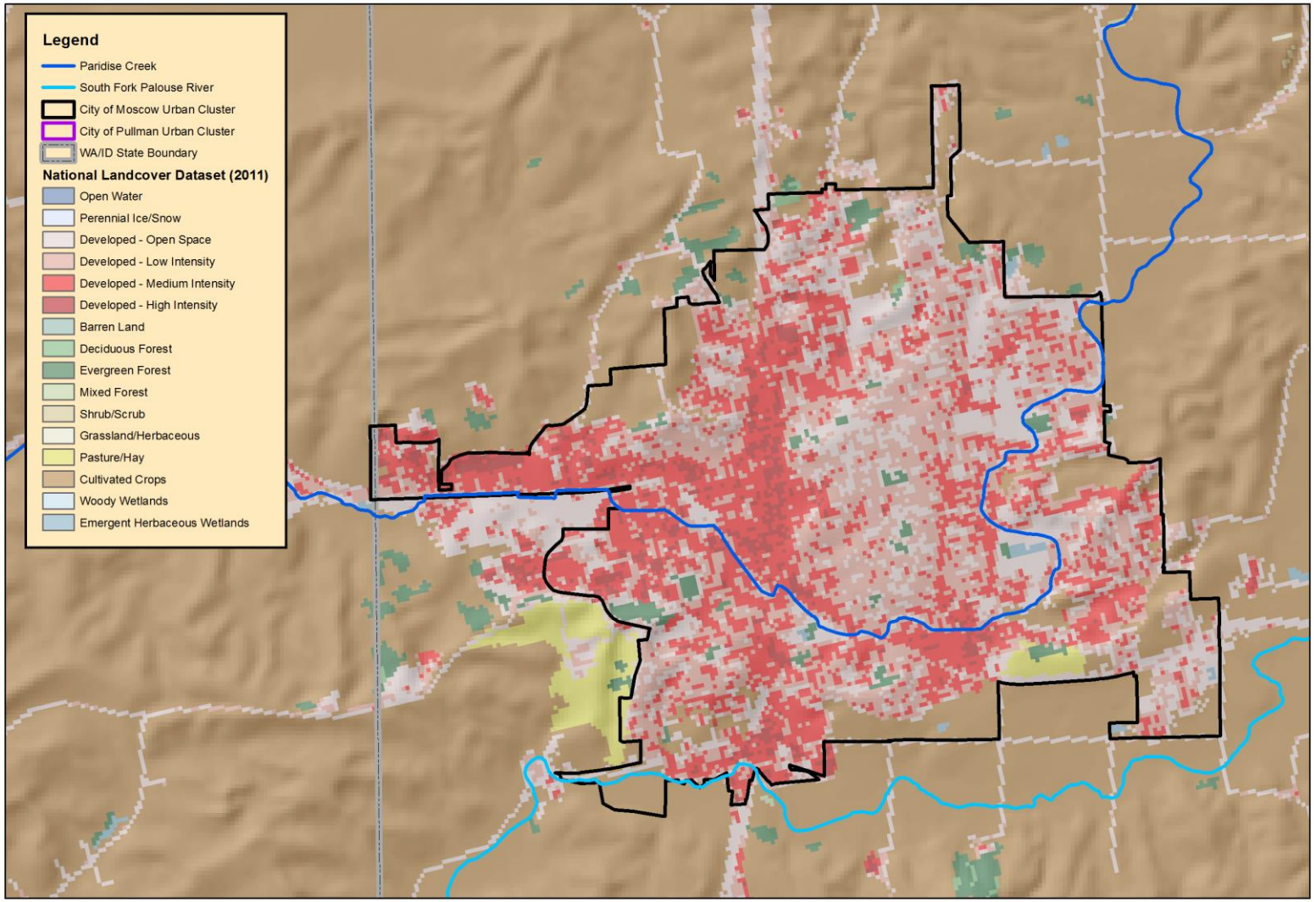


City of Moscow Urban Cluster
Ortho-Photo Imagery

0 0.15 0.3 0.6 Miles

N

USEPA - P. Leinenbach - 10/30/17

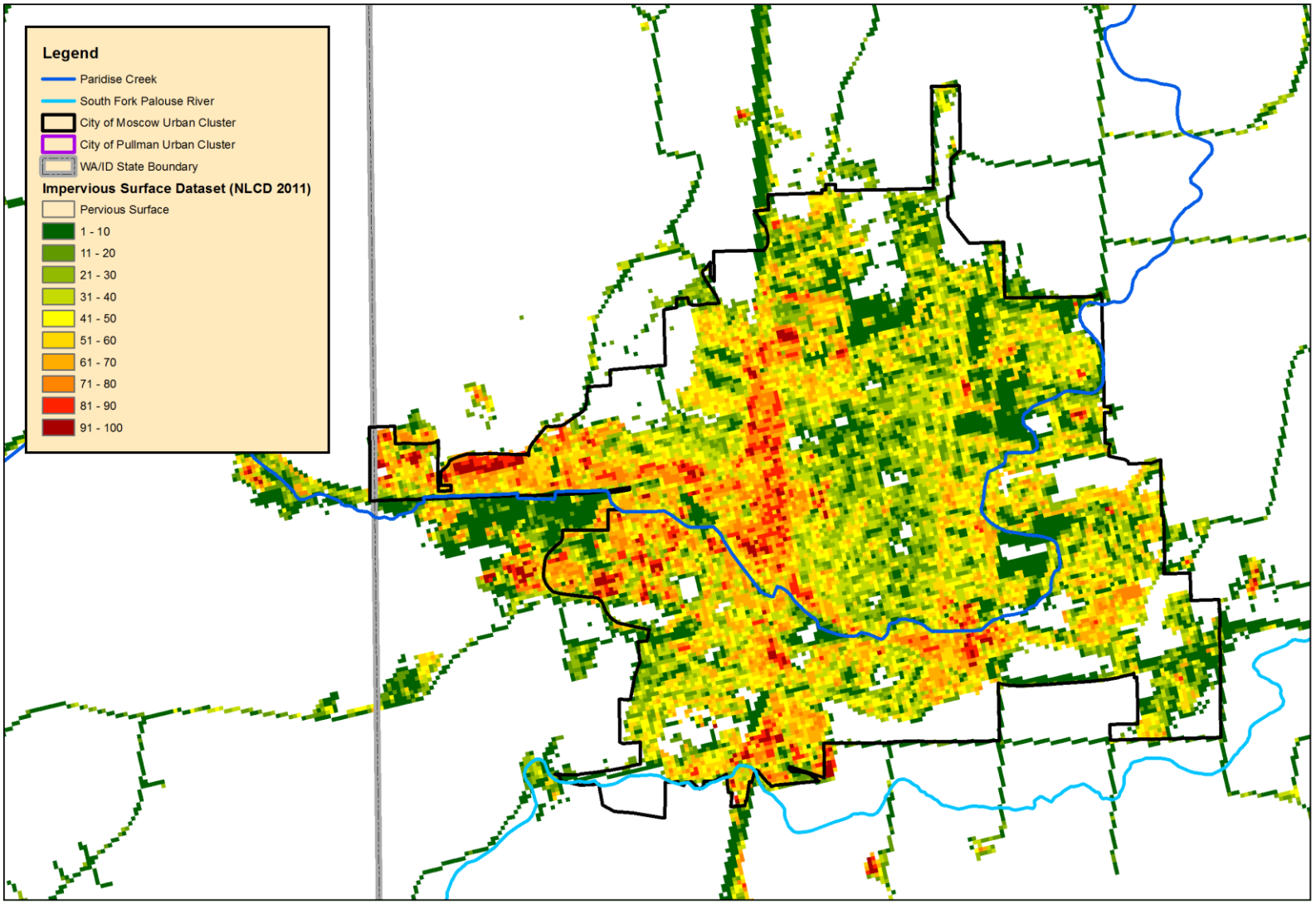


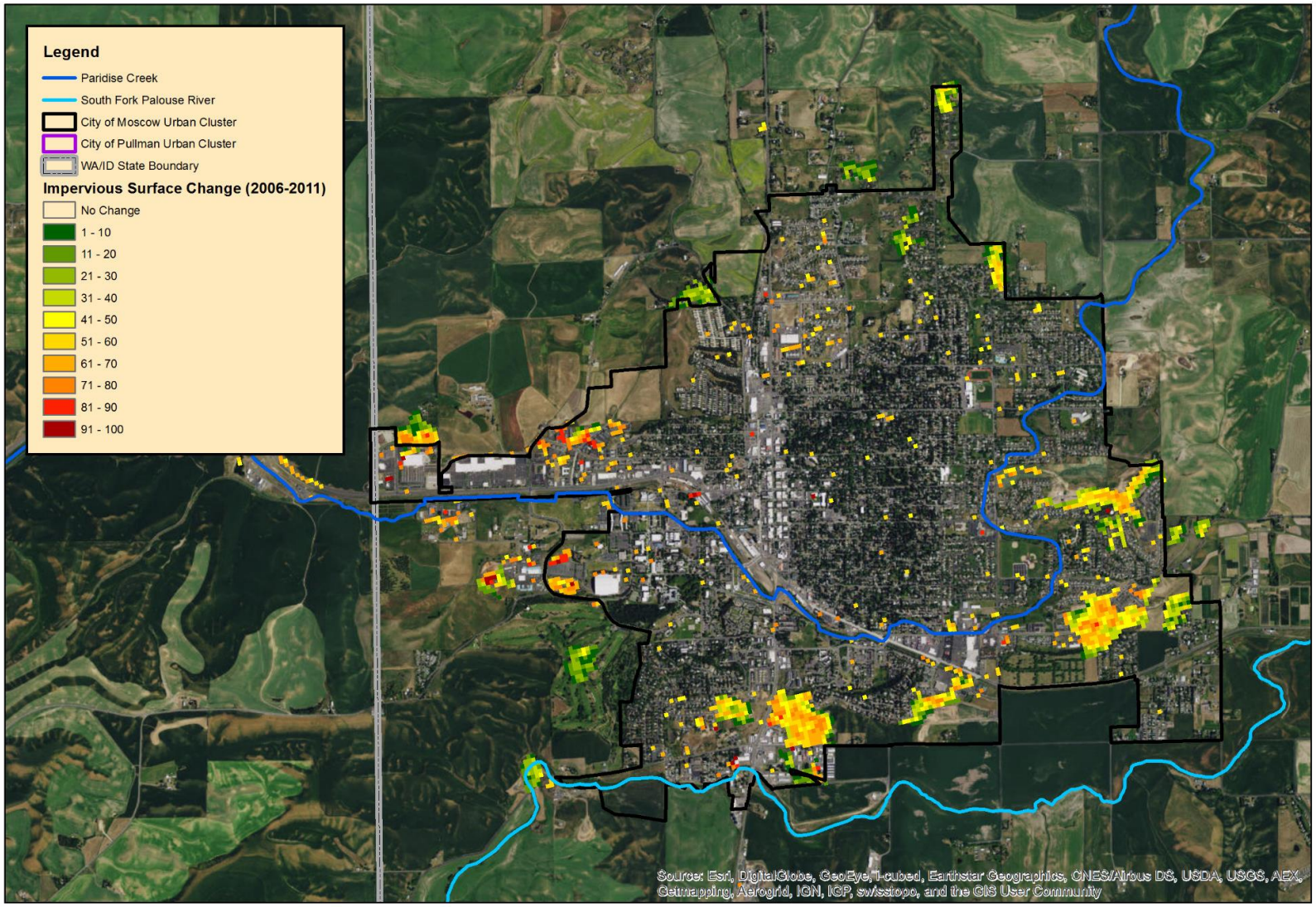
City of Moscow Urban Cluster
National Landcover Dataset (2011)

0 0.15 0.3 0.6 Miles

N

USEPA - P. Leinenbach - 10/30/17


Legend
Paridise Creek
South Fork Palouse River
City of Moscow Urban Cluster
City of Pullman Urban Cluster
WA/ID State Boundary
Impervious Surface Dataset (NLCD 2011)
Pervious Surface
1 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
City of Moscow Urban Cluster
Impervious Surface Dataset (2011)
0 0.15 0.3 0.6 Miles
N
USEPA - P. Leinenbach - 10/30/17



City of Moscow Urban Cluster
Impervious Surface Change Dataset (2006 to 2011)

0 0.15 0.3 0.6 Miles

N

USEPA - P. Leinenbach - 10/30/17

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