**TRANSPORTATION POOLED FUND PROGRAM**

**QUARTERLY PROGRESS REPORT**

Lead Agency (FHWA or State DOT): \_\_\_**FHWA**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**INSTRUCTIONS:**

*Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.*

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| **Transportation Pooled Fund Program Project #**TPF-5(454) | **Transportation Pooled Fund Program - Report Period:**□ Quarter 1 (January 1 – March 31) □ Quarter 2 (April 1 – June 30)□ Quarter 3 (July 1 – September 30)X Quarter 4 (October 1 – December 31) |
| **Project Title:**Update Precipitation Frequency Estimates for the Northwest (NOAA Atlas 14, Vol. 12) |
| **Name of Project Manager(s):**Megan Frye | **Phone Number:**(303) 396-9847 | **E-Mail**megan.frye@dot.gov |
| **Lead Agency Project ID:**FHWA | **Other Project ID (i.e., contract #):** | **Project Start Date:**June 3, 2020 |
| **Original Project End Date:**December 2023 | **Current Project End Date:**June 2024 | **Number of Extensions:** |

Project schedule status:

□ On schedule □ On revised schedule □ Ahead of schedule X Behind schedule

Overall Project Statistics:

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| **Total Project Budget** | **Total Cost to Date for Project** |  **Percentage of Work**  **Completed to Date** |
| $640,894 | $449,875 | 82% |

***Quarterly*** Project Statistics:

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|  **Total Project Expenses**  **and Percentage This Quarter** |  **Total Amount of Funds**  **Expended This Quarter** |  **Total Percentage of**  **Time Used to Date** |
| 0 / 0 | 0 | 77% |

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| **Project Description**:The purpose of this study is to determine precipitation frequency estimates for Idaho, Montana and other the Northwest States for durations of 5-minute through 60-day at average recurrence intervals (ARIs) of 1-year through 1,000-year. The estimates and associated bounds of 90% confidence intervals will be provided at 30 arc-sec resolution (approximately 800 x 800 m; varies with latitude). The study results will be published as volumes of NOAA Atlas 14, a wholly web-based publication available at www.nws.noaa.gov/ohd/hdsc. The publication will include the artifacts provided in previous NOAA Atlas 14 Volumes, including access through the Precipitation Frequency Data Server, base grids in standard formats together with error estimates, electronic copies of maps, charts of seasonal distributions and probabilistic temporal distributions of heavy precipitation, and detailed documentation. Updated areal reduction factors, which are needed to calculate analogous areal precipitation frequency estimates, will be developed as a separate appendix to NOAA Atlas 14 for the entire U.S. They include regional frequency analysis based on L-moments including error estimates, a combination of PRISM based techniques and CRAB for spatial interpolation, techniques for the analysis of climatic trend, temporal distribution and seasonality, internal consistency checks and variety of automated processes designed to enhance productivity. Intermediate results in the form of hourly and daily estimates at several ARIs will be distributed for peer review as will the final documentation. |

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| **Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**NOAA completed and shared the preliminary estimates for review with individuals who expressed interest in the review and/or subscribed to our list server. The Peer Review commenced on October 12 and completed on December 22, 2023. In this period, NOAA also compiled the received feedback and started to address it. In addition, NOAA completed an additional round of station cleanup for all stations in the analysis using a 4- mile radius. They updated the high priority daily datasets, such as NCEI’s Global Historical Climatology Network daily (GHCNd) and USDA’s automated Snow Telemetry (SNOTEL) network, through the end of October 2023, and started final quality control task of all daily data on the annual maximum series data for all datasets for all durations 1-day through 60-day.Additional information is on the status of the Atlas 14, Volume 12 work is available at: https://www.weather.gov/owp/hdsc\_current\_projects |
| **Anticipated work next quarter**:In the next quarter, NOAA will continue to update datasets with the most recent precipitation record where available and extract AMS for the appended years. They will address comments received from reviewers and work on developing the final precipitation frequency estimates, and supplemental information (e.g. rainfall analysis, seasonality, temporal distributions, and documentation).  |

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| **Significant Results:**All NOAA Atlas 14 Volumes are subject to peer review which provides critical feedback on the reasonableness of point precipitation frequency estimates, their spatial patterns, and station metadata. This allows incorporation of the reviewers’ local knowledge of rainfall patterns and rain gauge networks into the final product. On October 12, 2023, NOAA published the preliminary (Version 1) results for Volume 12 on the peer review page and sent an invitation for the review to individuals who expressed interest in the review and/or subscribed to the list server. The peer review process concluded on Friday, December 22, 2023. At that time, NOAA consolidated and reviewed all comments, and started to address them accordingly. NOAA received 10 responses from federal, state agencies and the private sector. Concerns raised were regarding inconsistencies between durations, abrupt/abnormal increases/decreases relative to Atlas 2 and differences in some locations when compared to previous NWS and private sector studies. HDSC began reviewing these comments and will address them accordingly. NOAA will publish all comments (anonymously) with the resulting action as Appendix of Volume 12 document.  |
| **Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that** **might affect the completion of the project within the time, scope and fiscal constraints set forth in the** **agreement, along with recommended solutions to those problems).**Delay in finalizing the IAA with NOAA. NOAA has faced delays in the availability of existing personnel to commit to the project. The project milestone schedule has been updated and completion of the project has been delayed from Q4 of 2023 to Q2 of 2024.Current Schedule:* *Data collection, formatting, and initial quality control [Completed]*
* *Extraction of annual maximum series (AMS); additional quality control and data reliability tests (e.g., outliers, independence, consistency across durations, duplicate stations, candidates for merging)] [Completed]*
* *Regionalization and frequency analysis [Completed]*
* *Initial spatial interpolation of precipitation frequency (PF) estimates and consistency checks across durations [Completed]*
* *Peer review [Completed]*
* **Revision of PF estimates [In Q2 of 2024; In Progress]**
* Remaining tasks (e.g., development of precipitation frequency estimates for partial duration series, seasonality, temporal distributions, documentation) [Q2 2024]
* Web publication [Q2 2024]
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| **Potential Implementation:** All deliverables will be accessible through the Precipitation Frequency Data Server (PFDS). That includes:* Interactive map of the United States. Via this map, IDF/DDF tables and curves will be available for any location in the project area.
* Precipitation frequency grids in GIS compatible formats.
* Metadata in Federal Geographic Data Transfer Standard format.
* Cartographic maps of precipitation frequency estimates.
* Charts of the seasonal distribution of annual maxima
* Probabilistic temporal distributions for 6-hour, 12-hour, 24-hour, and 96-hour durations in both chart and digital form
* Rainfall frequency estimates with corresponding upper and lower bounds of 90% confidence intervals will be available at 30-arc sec grid for durations of 1, 2, 3, 6, 12 and 24 hours.
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