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# Ecosystem Management and Restoration Research Program

# Project Record

# Project Title: Integrating Environmental Considerations with Water Resource Simulations

# Reference SON: 2015-ER-5 Integrating Environmental Considerations with Water Resource Simulations

# Lead PI: Todd Steissberg

# Latest Update: October 12, 2021

# Deliverables

| Work Unit Major Deliverables/Tasks | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Task/Product** | **Milestones** | | **Status** | | **Remarks** |
| **Original Specified Delivery Date** | **Project Year** | **Percent Completion** | **Anticipated Delivery Date** |
| **(Qtr/FY)** | **(1,2,..n)** | **(%)** | **(Qtr/FY)** |
| Task 1: Water quality software design document | Q4/FY16 | 1 | 100 | Q4/FY16 | Complete and in review |
| Task 2: Water quality engine and HEC-ResSim unit test program with 1D water quality capabilities | Q4/FY17 | 2 | 100 | Q4/FY17 | Complete. Note: The original proposed task was an alpha version of HEC-ResSim with temperature capability only |
| Task 3: EL Water Quality libraries developed and ready to link with HEC-ResSim | Q3/FY17 | 2 | 100 | Q3/FY17 | Complete |
| Task 4: Beta version: HEC-ResSim with 1D temperature & eutrophication water quality capabilities | Q3/FY18 | 3 | 100 | Q1/FY20 | Contract delayed & increased level of effort. Development will be complete by December 31, 2019. |
| Task 5: Software tested and ready to deploy | Q4/FY18 | 3 | 100 | Q4/FY20 | This will be completed concurrently with Task 4. |
| Task 6: Software documentation prepared | Q4/FY18 | 3 | 100 | Q4/FY20 | This will be completed concurrently with Task 4. |
| Task 7: Deployment Version: HEC-ResSim with 1D temperature and eutrophication water quality simulation and analysis capabilities, with documentation, ready to post to HEC and ERDC-EL websites | Q2/FY19 | 4 | 100 | Q4/FY21 | The current Beta version is being used for studies and may be used by Districts. Several improvements are being implemented under contract with FY20 funds as well as supplemental funds from SCWA and possibly USBR |
| Task 8: Technical Transfer: Two-day water quality modeling workshop (HEC and ERDC-EL) | Q2/FY19 | 4 | 100 | Q4/FY20 | This task will be completed concurrently with Tasks 4 – 7 using the Alpha and Beta versions of HEC-ResSim. |
| Task 9: Technical Transfer: Documentation posted to HEC and EL websites, reports and papers prepared | Q2/FY19 | 4 | 100 | Q4/FY20 | This task will be completed concurrently with Tasks 4 – 7 using the Alpha and Beta versions of HEC-ResSim. |

# Deviations

| Significant Changes of Plan, Delays, Problems | | |
| --- | --- | --- |
| **Task/Product/Goals** | **Description of Change** | **Remarks/Justification/Impacts** |
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|  |
| Task 4: Beta version: HEC-ResSim with 1D temperature & eutrophication water quality capabilities | Delay completion date Q1/FY20 and increase budget by $200,000. | * Significant contracting delays were encountered   + The contracting office rejected sole source justification.   + The contract will be awarded on EL’s IDIQ with RMA. * The review of the design document and discussions during contracting identified areas that need more extensive work than anticipated to meet the needs of the field users. * A budget increase of $200,000 in FY19 was requested to complete the integration of the water quality engine with the ResSim decision engine for making reservoir release decisions based on water quality. |
| Task 5: Software testing | Delay completion date to Q2/FY19, concurrent with Task 4 | * This task cannot be completed until Task 4 is completed. |
| Task 6: Software documentation | Delay completion date to Q2/FY20, concurrent with Task 4 | * Portions of this task can be performed concurrently, so we only anticipate a 3 month delay for this task. |
| Task 7: Release Version: HEC-ResSim with 1D temperature and eutrophication water quality simulation and analysis capabilities, with documentation, ready to post to HEC and ERDC-EL websites | Delay completion date to Q2/FY20 | * This task will prepare the release package and final reviewed draft of the user’s manual. |
| Task 8: Technical Transfer: Two-day water quality modeling workshop (HEC and ERDC-EL) | Delay completion to Q2/FY20 | * This task can be performed concurrently with Tasks 4 - 7. |
| Task 9: Technical Transfer: Documentation posted to HEC and EL websites, reports and papers prepared | Delay completion to Q2/FY20 | * This task can be performed concurrently with Tasks 4 - 7 |

# Other Achievements

| Big Wins/Other Significant Activities | | |
| --- | --- | --- |
| **Description** | **Qtr/FY** | **Remarks/Impacts** |
| The water quality libraries and components of the water quality engine were implemented for water quality modeling of the Columbia River watershed, in support of NWD’s Columbia River System Operation Environmental Impact Statement | Q3/17 | * Total Dissolved Gas (TDG) simulation capability was added to address TMDLs for ecosystem management of the Columbia-Snake-Clearwater River watershed. Supersaturated TDG concentrations, which are caused by air entrainment in dam spillways, can induce gas bubble trauma in fish, leading to significant morbidity and mortality. |
| HDF5 interface libraries were built that can be used with Fortran, .Net (Visual Basic and C#), and Java. These libraries provide a user-friendly interface for exchanging data with HDF5 files. | Q4/17 | * The new HDF5 interface libraries can be easily implemented to meet hydrologic and ecosystem modeling data needs. These will be used by HEC-ResSim, HEC-HMS, and HEC-RAS, and other programs to store and retrieve hydrologic and environmental data. |
| The Sonoma County Water Agency (SCWA) has selected the HEC-ResSim water quality software being developed during this work unit for water quality modeling of the Russian River and Lake Mendocino, in conjunction with the USACE Forecast-Informed Reservoir Operations project. | Q4/18 | * SCWA will provide $402k of funds for software and model development in FY19. Approximately $100k of these funds are for HEC-ResSim water quality software development. * These funds will supplement the EMRRP R&D funds to complete the software development and will also add new features, such as benthic algae simulation capability, which is needed by many projects. * This project will serve as the case study for the water quality modeling workshop and technical reports for the Technical Transfer portion of this work unit. |
| Presented new HEC-ResSim-WQ features at National Conference for Ecosystem Restoration (NCER), July 2021 | Q4/21 | * Increased awareness of new capabilities |

# Obligations and Expenditures

When a project is selected for funding – and prior to initial disbursement of funds - an obligation/expenditure plan will be developed. As emphasis has shifted from full obligation to full expenditure of funds, this information is necessary to enable the program manager to make projections for the coming fiscal year, and to prioritize distribution of funds in-hand as and where they are most needed. We are now required to make projections for program obligations and expenditures in two categories: labor and non-labor. Please allocate projections accordingly in the following table, and update periodically along with the other documentation in the Project Record.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Obligation and Expenditure Projections** | | | | | | | | | | | | | | | |
| **FY** | **Project Year** | **Categories** | **OCT** | **NOV** | **DEC** | **JAN** | **FEB** | **MAR** | **APR** | **MAY** | **JUN** | **JUL** | **AUG** | **SEP** | **FY**  **TOTAL** |
| **(1,2,…n)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** | **($K)** |
| 20 | 4 | **Contract and Purchase Obligations** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Labor Expenditures** | 5 | 10 | 5 | 10 | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **5** | **10** | **5** | **10** | **10** | **10** | **0** | **0** | **0** | **0** | **0** | **0** | **50** |
| **Total FY Project Funding** | | | | | | | | | | | | | | |  |