

Development of Hydropower Biological Evaluation Toolset (HBET)

V2.1.9 Release Notes for HBET

July 2024

Hongfei Hou, Daniel Deng, Aljon Salalila, Jun Lu

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Prepared for the U.S. Department of Energy
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Summary

The following release notes reflect changes made to HBET for proposed changes to be released in July 2024. Notes are broken up into three sections: 1) Key Improvements, 2) Bug Fixes, and 3) Data Changes

- Key Improvements: primary features added and changes to existing features that affect the user experience.
- Bug Fixes: Issues discovered or reported that were fixed in the proposed work to be released.
- Data Changes: Any work done on the databases directly or the process to calculate data for the system.

1.1 Key Improvements:

- Enhanced functionality to accommodate data collected using Sensor Fish Mini. Sensor Fish Mini, developed by PNNL in 2018 as a compact iteration of the Sensor Fish, is utilized to assess fish passage conditions and physical stressors in small hydraulic structures. Small hydro, comprising 89 percent of non-federal facilities with capacities under 30 megawatts, is the primary application area. Sensor Fish Mini captures acceleration, rotational velocities, orientation, pressure, and temperature data.

PNNL upgraded the HBET by integrating functionality tailored for Sensor Fish Mini data. The latest version of HBET supports both raw data file format and comma-separated values (CSV) file format.

The raw data file commences with a line detailing Sensor Fish Mini settings used during data collection, including start date time, sample rate, sampling period, delay before acquisition, and delay after acquisition. Subsequent lines contain hexadecimal data, each

36 characters in length. These data are employed to compute nine measurements, each represented by four characters: pressure, voltage, accelerations in the X, Y, and Z axes, rotational speeds in the X, Y, and Z axes, and temperature.

```

0007_R001_H5_20240709093102.rawm - Notepad
File Edit Format View Help
20000104002157540800003C000500050800
08010DF1000D000C000B062CFBDFCB0093C
07FD0DDA000E000E000A0622FBB3FCA4093C
07FC0DCC000D000E00080619FBA8FC9C093C
07FC0DCA000D001D00080619FBA8FC9C093C
07FB0DC9000F000D00060608FB97FC8D093C
07FC0DC8000B000F000905E5FB97FC81093C
07FC0DC8000C000D000C05E5FB97FC81093C
07FB0DC7000D000F000A05BDFB97FC75093D
07FB0DC7000E0009000E05BDFB97FC75093D
07FB0DC6000F0008000A058BFB9DFC71093D
07FC0DC6001000090006058BFB9DFC71093D
07FC0DC60011000E00060563FBA2FC69093D
07FC0DC60010000F000B0563FBA2FC69093D
07FC0DC6000D000B000B0543FB9EFC5F093D
07FB0DDD000B000E00080543FB9EFC5F093D
Ln 1, Col 1    110%    Windows (CRLF)    UTF-8

```

The CSV file begins with Sensor Fish Mini settings in the first two rows, while measurement data starts from the fourth row. The file comprises 9 columns: time, voltage, Acc_x, Acc_y, Acc_z, Acc, Pressure, Gyro_x, Gyro_y, Gyro_z, Gyro, and Temperature.

| 0007_R001_H5_20240709093102.csv | | | | | | | | | | | | |
|---------------------------------------------------------------------------|----------------|------------|----------------|------------------------|-----------------------|------|----------|----------|----------|----------|----------|-------------|
| AutoSave Off | | | | | | | | | | | | |
| File Home Insert Page Layout Formulas Data Review View Automate Help Team | | | | | | | | | | | | |
| Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins | | | | | | | | | | | | |
| A1 fx DateTime | | | | | | | | | | | | |
| A | B | C | D | E | F | G | H | I | J | K | L | |
| 1 | DateTime | SampleRate | SamplingPeriod | DelayBeforeAcquisition | DelayAfterAcquisition | | | | | | | |
| 2 | 1/4/2000 21:57 | 2048 | 60 | 5 | 5 | | | | | | | |
| 3 | Time | Voltage | Acc_x | Acc_y | Acc_z | Acc | Pressure | Gyro_x | Gyro_y | Gyro_z | Gyro | Temperature |
| 4 | s | v | g | g | g | g | psia | degree/s | degree/s | degree/s | degree/s | °F |
| 5 | 0 | 4.05 | 1.07 | -0.52 | 1.03 | 1.58 | 12.7 | -133.66 | -192.61 | -103.34 | 256.21 | 0 |
| 6 | 0.000488281 | 4.02 | 1.27 | -0.61 | 0.93 | 1.69 | 12.16 | -134.88 | -191.39 | -104.81 | 256.53 | 0 |
| 7 | 0.000976563 | 4.01 | 1.27 | -0.52 | 0.73 | 1.56 | 12.03 | -136.23 | -190.29 | -105.78 | 256.82 | 0 |
| 8 | 0.001464844 | 4.01 | 2.76 | -0.52 | 0.73 | 2.9 | 12.03 | -136.23 | -190.29 | -105.78 | 256.82 | 0 |
| 9 | 0.001953125 | 4 | 1.17 | -0.71 | 0.52 | 1.47 | 11.89 | -138.3 | -188.22 | -107.62 | 257.16 | 0 |
| 10 | 0.002441406 | 4 | 1.37 | -0.34 | 0.83 | 1.64 | 12.03 | -138.3 | -183.94 | -109.08 | 254.68 | 0 |
| 11 | 0.002929688 | 4 | 1.17 | -0.43 | 1.14 | 1.69 | 12.03 | -138.3 | -183.94 | -109.08 | 254.68 | 0 |
| 12 | 0.003417969 | 4 | 1.37 | -0.52 | 0.93 | 1.74 | 11.89 | -138.3 | -179.06 | -110.55 | 251.81 | 0 |
| 13 | 0.00390625 | 4 | 0.77 | -0.61 | 1.34 | 1.67 | 11.89 | -138.3 | -179.06 | -110.55 | 251.81 | 0 |
| 14 | 0.004394531 | 4 | 0.68 | -0.71 | 0.93 | 1.35 | 11.89 | -137.57 | -172.96 | -111.03 | 247.32 | 0 |
| 15 | 0.004882813 | 4 | 0.77 | -0.8 | 0.52 | 1.23 | 12.03 | -137.57 | -172.96 | -111.03 | 247.32 | 0 |
| 16 | 0.005371094 | 4 | 1.27 | -0.89 | 0.52 | 1.64 | 12.03 | -136.96 | -168.07 | -112.01 | 244.03 | 0 |
| 17 | 0.005859375 | 4 | 1.37 | -0.8 | 1.03 | 1.89 | 12.03 | -136.96 | -168.07 | -112.01 | 244.03 | 0 |
| 18 | 0.006347656 | 4 | 0.97 | -0.52 | 1.03 | 1.51 | 12.03 | -137.45 | -164.17 | -113.23 | 242.21 | 0 |
| 19 | 0.006835938 | 4.03 | 1.27 | -0.34 | 0.73 | 1.5 | 11.89 | -137.45 | -164.17 | -113.23 | 242.21 | 0 |
| 20 | 0.007324219 | 4.01 | 1.37 | -0.52 | 1.24 | 1.92 | 12.16 | -137.93 | -160.51 | -114.09 | 240.42 | 0 |
| 21 | 0.0078125 | 4 | 0.87 | -0.06 | 0.93 | 1.28 | 11.89 | -139.03 | -157.45 | -114.7 | 239.33 | 0 |
| 22 | 0.008300781 | 4 | 1.07 | -0.8 | 0.52 | 1.44 | 11.89 | -139.03 | -157.45 | -114.7 | 239.33 | 0 |
| 23 | 0.008789063 | 4 | 2.96 | -0.71 | 0.52 | 3.09 | 12.03 | -141.23 | -154.89 | -115.31 | 239.23 | 0 |
| 24 | 0.009277344 | 4 | 1.37 | -0.71 | 0.73 | 1.71 | 11.89 | -141.23 | -154.89 | -115.31 | 239.23 | 0 |
| 25 | 0.009765625 | 4 | 1.17 | -0.61 | 1.03 | 1.68 | 12.03 | -142.69 | -152.08 | -115.55 | 238.42 | 0 |
| 26 | 0.010253906 | 4 | 1.17 | -0.25 | 1.14 | 1.65 | 12.03 | -142.69 | -152.08 | -115.55 | 238.42 | 0 |
| 27 | 0.010742188 | 4 | 0.97 | -0.43 | 0.83 | 1.35 | 12.03 | -143.92 | -150.62 | -115.79 | 238.34 | 0 |
| 28 | 0.011230469 | 4 | 0.97 | -0.61 | 0.93 | 1.48 | 11.89 | -143.92 | -150.62 | -115.79 | 238.34 | 0 |

1.2 Bug Fixes:

There are no bug fixes included in this release.

1.3 Data Changes:

There are no changes related to databases in this release.