**Salmonid Habitat Suitability Model README**

Starting the application:

* Simply double-click to open and wait- it takes a long time (often up to one minute) It will seem like nothing is happening, but patience prevails.

Setting up the input files:

* The program requires two single-band rasters (depth/velocity) of the same extent and pixel size.
* Tested raster file types include: .tif and .img (other file types are supported, but not tested).

Running the program:

* Load the depth and velocity rasters using the ‘Open xxxxxx’ buttons.
* Select the salmonid species and life stage from the dropdown menu.
  + All data for the preference curves comes from the Washington Dept. of Fish and Wildlife (WDFW) Instream Flow Study Guidelines (last updated March 2016)
  + For Chinook small rivers have <3,000 cfs mean annual flow, and according to the WDFW the only ‘large’ rivers (>3,000 cfs MAF) are the Skagit and Snohomish
  + Coho and Sockeye juvenile preference curves are not supported in the WDFW study
* The ‘Export As Raster’ button creates a .tif file
* of the habitat suitability normalized from 0 to 1.
  + The spatial reference for the raster will be whatever was used in the input rasters, but the projection is not defined when opened in ArcGIS (or other GIS applications).

How does it work:

1. The input depth and velocity rasters are converted into numpy arrays.
2. Two piece-wise suitability curves (for both depth and velocity) are created from the chosen species/life stage.
3. The numpy arrays are then normalized to the suitability curves, so that each value in each array is converted into the corresponding suitability value
4. The normalized depth and velocity arrays are then multiplied together to create a final suitability array.
5. The final array is then converted back into a raster.

Python libraries and dependencies used:

* Numpy
* Tkinter
* Scipy
* GDAL

References:

Washington Department of Fish and Wildlife Instream Flow Study Guidelines:

<https://fortress.wa.gov/ecy/publications/documents/0411007.pdf>

Process overview for spawning Chinook on the Cedar River.







