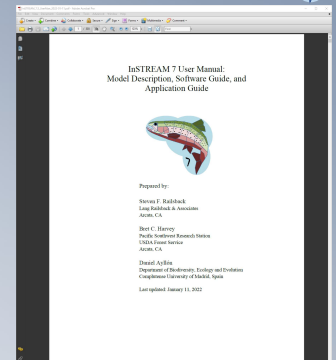# InSTREAM and InSALMO Software

The User Manual

- Complete model description

- Software guide

- Application guide (study sites, input, calibration, designing and analyzing simulation experiments, validation, uncertainties…)

- A living document. Current versions at: https://ecomodel.humboldt.edu
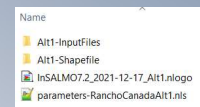

NetLogo is:

- The most popular software platform for individual-based ("agent-based") modeling
- Provided free by Northwestern U. (but please donate!)

- A graphical user interface
- A high-level, simple, powerful programming language with hundreds of built-in modeling commands
- Comprehensive documentation and support
- A large, active user community
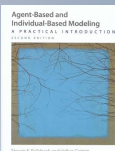
InSTREAM's "Projects"

- A project is a directory tree with:
  - ➤ The NetLogo file (model code, graphical interface)
    - Usually customized for each application
  - ➤ A parameter file
  - ➤ A set of input files
  - ➤ A GIS shapefile
  - ➤ Output files

Name
Alt1-InputFiles
Alt1-Shapefile
InSALMO7.2_2021-12-17_Alt1.nlogo
parameters-RanchoCanadaAlt1.nls

- Keep a separate project for each application, including separate analyses of the same site

Now:

- Look at distributed project: Exercise 1
- Open the model
- Tabs: Interface, Info, Code
- Interface buttons and switches
- Random number seed
- Setup, go, step
- Inspectors
- Code tab
- Parameter file

Input files

Name	Date modified	Size
Shapefile	5/13/2022 7:33 AM	
CC3_TimeSeriesInputs-Std.csv	2/26/2020 10:39 AM	122 KB
CC3C-InitialPopulations.csv	4/18/2022 2:36 PM	1 KB
CC3-Depths.csv	6/26/2020 2:45 PM	240 KB
CC3-Vels.csv	6/26/2020 2:45 PM	239 KB

- All input files use:
  - ➤ .CSV format, for editing in Excel etc. (except shapefile)
  - ➤ Metric units (m)

Shapefile

- A standard ARC GIS shapefile with:
  - Cell boundaries as polygon features
  - Static cell habitat variables as polygon properties
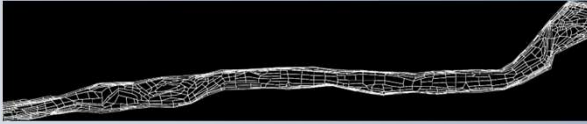
Depth and velocity files

- Lookup tables of cell depth and velocity over a wide range of flows
- Generated by any hydraulic model & GIS

1.42 m3/s = 50 cfs

Time series inputs

- This file defines the flow, temperature, and turbidity scenario

- Values can be daily, hourly, weekly...

Initial populations

- How many fish, of which species and age, are created in each reach at the start of a simulation

Output files

- All outputs are in .CSV format

- Each model run (click on "setup") creates unique output file names:
  ```
  BriefPopOut-08-23-16.734_AM_13-May-2022.csv
  ReddSummaryOut-08-23-16.734_AM_13-May-2022.csv
  BriefPopOut-08-33-23.225_AM_13-May-2022.csv
  ```

- Understanding results usually requires a variety of analyses, so output files provide raw "data" in formats that facilitate many kinds of analysis
  - Excel PivotTables

Brief population output

Redd summary output

• One row per redd reports egg fates

Fish (and redds) events output

• Indicates when and where events happened to individual fish (redds)
  ➢ Initialized
  ➢ Died, of what cause
  ➢ Spawned
  ➢ etc.

Fish events output file   PivotTable summary

You control how much output you get

Every time step:

```
; Model run parameters
set start-date "10/1/2000"
set end-date   "9/30/2001"
set file-output-frequency  1     ; Number of time units between file output updates - must be an int
set file-output-units "minutes"  ; Time units for file-output-frequency: "minutes", "hours", "days",
                                 ; Use 1 "minutes" to get output every time step.
set census-days  (list "6/15" "9/30")  ; List of days of year (MM/dd format) on which "is-census?"
set census-years-to-skip 2       ; Number of years at start of simulation before "is-census?" can be
```

Every 10 days:

```
; Model run parameters
set start-date "10/1/2000"
set end-date   "9/30/2001"
set file-output-frequency  10      ; Number of time units between file output updates - must b
set file-output-units "days"   ;   ; Time units for file-output-frequency: "minutes", "hours", "da
                                   ; Use 1 "minutes" to get output every time step.
set census-days  (list "6/15" "9/30")  ; List of days of year (MM/dd format) on which "is-ce
set census-years-to-skip 2         ; Number of years at start of simulation before "is-census?"
```

Versions

• Major versions (4, 5, 6…) add significant new capabilities
  ➢ We have no plans for inSTREAM 8

• Minor versions (7.2, 7.3…) have changes that affect results, input files, parameters

• Small updates may designated only via the release date:
  `InSTREAM7.3_2022-08-09.nlogo`

• Changes are documented:
  ➢ User Manual change log
  ➢ Software: Info tab