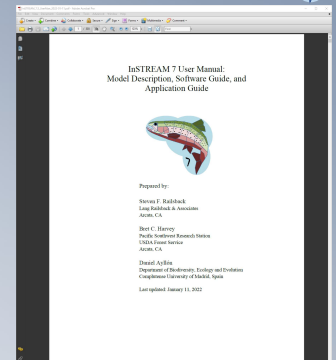


InSTREAM and InSALMO Software



The User Manual

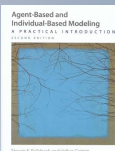
- Complete model description
- Software guide
- Application guide (study sites, input, calibration, designing and analyzing simulation experiments, validation, uncertainties...)
- A living document.
Current versions at:
<https://ecomodel.humboldt.edu>



NetLogo is:

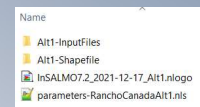


- The most popular software platform for individual-based ("agent-based") modeling
- Provided free by Northwestern U. (but please donate!)
- A graphical user interface
- A high-level, simple, powerful programming language with hundreds of built-in modeling commands
- Comprehensive documentation and support
- 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



- 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

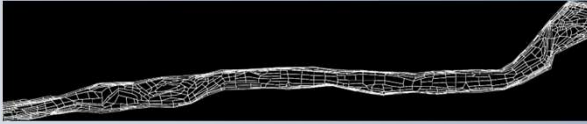
Input files

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-Wels.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 m/s =
50 cfs

Time series inputs

- This file defines the flow, temperature, and turbidity scenario
- Values can be daily, hourly, weekly...

	A	B	C	D
1	; Time series inputs for 3C sites			
2	; From standard inSALMO projects			
3	; SFR 26 Feb 2020			
4	Date	temperature	flow	turbidity
5	10/1/1999 12:00	13.1	6.37	2
6	10/2/1999 12:00	13.2	5.69	1
7	10/3/1999 12:00	13.1	5.72	1
8	10/4/1999 12:00	13.2	5.72	1
9	10/5/1999 12:00	12.7	5.72	1
10	10/6/1999 12:00	13	5.75	2
11	10/7/1999 12:00	12.7	5.72	1
12	10/8/1999 12:00	13.1	5.72	1
13	10/9/1999 12:00	13	5.69	1
14	10/10/1999 12:00	13.1	5.69	1
15	10/11/1999 12:00	13	5.69	1
16	10/12/1999 12:00	12.9	5.69	1
17	10/13/1999 12:00	12.7	5.69	1
18	10/14/1999 12:00	12.8	5.69	1
19	10/15/1999 12:00	12.4	5.69	1
20	10/16/1999 12:00	11.9	5.69	1
21	10/17/1999 12:00	11.9	5.69	1

Initial populations

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

	A	B	C	D	E	F	G
1	; Trout initialization input for InSTREAM-7						
2	; Standard initialization for Clear Creek 3A, C						
3	; Hypothetical rainbow population						
4	Species	Reach	Age	Number	Length min	Length mode	Length max
5	Rainbow	ClearCrk3C		0 400	4	6.1	7
6	Rainbow	ClearCrk3C		1 50	9	12	15
7	Rainbow	ClearCrk3C		2 50	15	17	25

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

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	InSTREAM-7 brief Created 08/23/21 15:2 AM 13-May-2022															
2	End of time step	ICensus?	phase	Reach	Flow	Temperature	Turbidity	Species	Age class	Count	Mean length	Mean weight	Mean condition	Fraction Feeding	Fraction Search	Fraction Hiding
3	10/1/2000 0:00	FALSE	At setup	ClearCrk3C	5	0.009	0	Rainbow	Age-0	400	5.23533	2.12780	1	0	0	1
4	10/1/2000 0:00	FALSE	At setup	ClearCrk3C	5	0.009	0	Rainbow	Age-1	50	12.1104	21.8825	1	0	0	1
5	10/1/2000 0:00	FALSE	At setup	ClearCrk3C	5	0.009	0	Rainbow	Age-2	50	18.2012	72.9649	1	0	0	1
6	10/1/2000 5:45	FALSE	night	ClearCrk3C	5	13.4	2	Rainbow	Age-0	400	5.72676	2.32669	0.999282	0.6125	0.045	0.3425
7	10/1/2000 5:45	FALSE	night	ClearCrk3C	5	13.4	2	Rainbow	Age-1	50	12.1107	21.8842	0.999945	1	0	0
8	10/1/2000 5:45	FALSE	night	ClearCrk3C	5	13.4	2	Rainbow	Age-2	50	18.2008	72.9603	0.999986	1	0	0
9	10/1/2000 6:00	FALSE	dawn	ClearCrk3C	5	13.4	2	Rainbow	Age-0	400	5.72913	2.32748	0.999932	0.6075	0	0.3925
10	10/1/2000 6:00	FALSE	dawn	ClearCrk3C	5	13.4	2	Rainbow	Age-1	50	12.1118	21.8882	0.999938	0.6	0	0.4
11	10/1/2000 6:00	FALSE	dawn	ClearCrk3C	5	13.4	2	Rainbow	Age-2	50	18.2048	72.9699	0.999935	0.62	0	0.38
12	10/1/2000 17:15	FALSE	day	ClearCrk3C	5	13.4	2	Rainbow	Age-0	397	5.74617	2.33613	0.997802	0.382267	0	0.617733
13	10/1/2000 17:15	FALSE	day	ClearCrk3C	5	13.4	2	Rainbow	Age-1	50	12.11705	21.88289	0.998346	0.2	0	0.8
14	10/1/2000 17:15	FALSE	day	ClearCrk3C	5	13.4	2	Rainbow	Age-2	50	18.2048	72.9602	0.999942	0.53	0	0.5
15	10/1/2000 18:15	FALSE	dusk	ClearCrk3C	5	13.4	2	Rainbow	Age-0	397	5.74628	2.331349	0.997582	0.5919955	0	0.4080045
16	10/1/2000 18:15	FALSE	dusk	ClearCrk3C	5	13.4	2	Rainbow	Age-1	50	12.11716	21.89546	0.998959	0.36	0	0.64
17	10/1/2000 18:15	FALSE	dusk	ClearCrk3C	5	13.4	2	Rainbow	Age-2	50	18.20859	72.91395	0.999982	0.78	0	0.22
18	10/1/2000 5:45	FALSE	night	ClearCrk3C	5	13.2	2	Rainbow	Age-0	395	5.73802	2.331943	0.996005	0.611111	0.0328283	0.356006
19	10/1/2000 5:45	FALSE	night	ClearCrk3C	5	13.2	2	Rainbow	Age-1	50	12.11742	21.7026	0.997009	0.56	0	0.44
20	10/1/2000 5:45	FALSE	night	ClearCrk3C	5	13.2	2	Rainbow	Age-2	50	18.2096	72.92477	0.999452	0.54	0	0.46
21	10/1/2000 6:00	FALSE	dawn	ClearCrk3C	5	13.2	2	Rainbow	Age-0	395	5.73956	2.33022	0.999084	0.6333333	0	0.3666667
22	10/1/2000 6:00	FALSE	dawn	ClearCrk3C	5	13.2	2	Rainbow	Age-1	50	12.1179	21.7448	0.999517	0.54	0	0.46
23	10/1/2000 6:00	FALSE	dawn	ClearCrk3C	5	13.2	2	Rainbow	Age-2	50	18.20952	72.94915	0.999725	0.56	0	0.44
24	10/1/2000 17:15	FALSE	day	ClearCrk3C	5	13.2	2	Rainbow	Age-0	395	5.74165	2.33215	0.995409	0.2860795	0	0.7139241
25	10/1/2000 17:15	FALSE	day	ClearCrk3C	5	13.2	2	Rainbow	Age-1	50	12.12287	21.7117	0.998108	0.22	0	0.78
26	10/1/2000 18:15	FALSE	dusk	ClearCrk3C	5	13.2	2	Rainbow	Age-0	395	5.74184	2.33122	0.995771	0.6652914	0	0.3347086
27	10/1/2000 18:15	FALSE	dusk	ClearCrk3C	5	13.2	2	Rainbow	Age-1	50	12.12312	21.7242	0.998847	0.34	0	0.66
28	10/1/2000 18:15	FALSE	dusk	ClearCrk3C	5	13.2	2	Rainbow	Age-2	50	18.21547	72.9634	0.999108	0.82	0	0.18

Redd summary output

- One row per redd reports egg fates

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	InSTREAM Created 08:27:54.654 AM 13-May-2022												
2	ReddID	Species	Reach	Cell	DateCreated	DateEmptied	InitialEgg	EggDiedLow	EggDiedHighTemp	EggDiedD	EggDiedScour	EggDiedF	EggEmerg
3	1343	Rainbow	ClearCkK	430	4/26/2001	4/30/2001	270	0	0	0	270	0	0
4	1329	Rainbow	ClearCkK	540	4/3/2001	4/30/2001	265	0	7	0	258	0	0
5	1316	Rainbow	ClearCkK	525	4/16/2001	4/30/2001	188	0	3	0	185	0	0
6	1331	Rainbow	ClearCkK	329	4/4/2001	4/30/2001	231	0	7	0	224	0	0
7	1335	Rainbow	ClearCkK	540	4/11/2001	4/30/2001	294	0	5	0	289	0	0
8	1333	Rainbow	ClearCkK	104	4/6/2001	4/30/2001	275	0	4	0	271	0	0
9	1334	Rainbow	ClearCkK	550	4/6/2001	4/30/2001	89	0	0	0	59	30	0
10	1336	Rainbow	ClearCkK	107	4/1/2001	5/28/2001	301	0	30	0	0	0	271
11	1327	Rainbow	ClearCkK	540	4/1/2001	5/28/2001	117	0	15	0	0	0	102
12	1328	Rainbow	ClearCkK	235	4/2/2001	5/30/2001	374	0	30	0	0	0	344
13	1330	Rainbow	ClearCkK	541	4/3/2001	5/30/2001	189	0	16	0	0	0	173
14	1332	Rainbow	ClearCkK	322	4/5/2001	5/30/2001	75	0	12	0	0	0	63
15	1337	Rainbow	ClearCkK	218	4/17/2001	6/7/2001	190	0	33	0	0	0	157
16	1338	Rainbow	ClearCkK	218	4/18/2001	6/7/2001	76	0	17	0	0	0	59
17	1340	Rainbow	ClearCkK	525	4/20/2001	6/9/2001	107	0	23	0	0	0	84
18	1339	Rainbow	ClearCkK	245	4/19/2001	6/9/2001	239	0	47	0	0	0	192
19	1342	Rainbow	ClearCkK	525	4/22/2001	6/10/2001	255	0	65	0	0	0	190
20	1341	Rainbow	ClearCkK	104	4/21/2001	6/10/2001	275	0	74	0	0	0	201
21	1344	Rainbow	ClearCkK	525	5/8/2001	6/19/2001	74	0	26	0	0	0	48
22	1400	Rainbow	ClearCkK	217	5/25/2001	7/3/2001	255	0	93	0	0	0	162

Fish (and redds) events output

- Indicates when and where events happened to individual fish (redds)

- Initialized
- Died, of what cause
- Spawning
- etc.

Age												
Event	0	1	2	3								
died of fish predation	74	3										
died of poor condition	277	104	8	13								
died of terr predation	318	77	23	17								
emerged	2046											
initialized	400	50	50									
separated from superindividual	39											
spawned				7	13							

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 be
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?" can be

```

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