



Modeling the Environment: An Introduction to System Dynamics Modeling of Environmental Systems

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Guide to Exercises

The links in the 1st column take you to exercises that build on the exercises found in the book. Most of these are short exercises. They may be completed in routine assignments.

These are exercise collections in a variety of fields not covered in the book. Each collection has an introduction, a model and a mix of exercises for new students and for advanced students.

The short exercises are designed to be completed in routine class assignments.

The major exercises are more suitable for class projects.

Chapter Additions

[Ch2. Stocks and Flows](#)

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Appendix Additions

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Exercise Collections

[Anthropology \(The Tsembaga\)](#)

[Epidemiology \(Yellow Fever\)](#)

[Genetics \(Industrial Melanism\)](#)

[Liminology \(Eutrophication\)](#)

[Physics \(water temperature\)](#)

[Physiology \(human shivering\)](#)

[Resources \(natural gas in the US\)](#)

Short Exercises

[Bucks Only Hunting](#)

[Grasshopper Population](#)

[Ragwort Plant and its Seeds](#)

[Let's Go for a Hike](#)

Major Exercises

[Rivers in the West:
The Idagon](#)

[Model Merger Exercise:
The Brine Shrimp of Mono Lake](#)

[Toward Global Equilibrium and
The Limits to Growth](#)

Guide to Cases and Models

The links in the 1st column take you to extra information on three of the major cases used in the book.

Cases

[Water Flows in the Mono Basin and the Water Supply for Los Angeles \(chapter 4\)](#)

[The Salmon Smolts Spring Migration \(chapter 13\)](#)

[The Life Cycle of the Tucannon Salmon \(chapter 14\)](#)

[The Kaibab Deer Herd \(chapter 16\)](#)

Use these links if you wish to download some of the Stella models described in the book.

Models

[Equations for the DDT Models \(chapter 12\)](#)

[The Smolts Migration Model \(chapter 13\)](#)

[The Tucannon Harvest Manager \(chapter 14\)](#)

[The Feebate Management Model \(chapter 20\)](#)

[The Daisyworld Flight Simulator \(chapter 21\)](#)

[The Idagon Flight Simulators \(appendix K\)](#)

If you don't have Stella, you may still experiment with these models using a free "run time version " of the software available at the High Performance Systems [Website](#)

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Extra Background on the Mono Lake Case

The Mono Lake pages provide additional information to supplement the brief introduction to the case in chapter 4 of the book. The additional background will be useful if you conduct a class project to expand and improve the model in chapter 4.

[Hydrology Summary](#) | [Wildlife Summary](#)
[Key Lake Levels & the WRCB Decision](#)
[Water Supply for Los Angeles](#)

Links to Related Websites:

[Mono Lake Committee](#)
[Los Angeles Department of Water & Power](#)
[Metropolitan Water District](#)
[List of Water Policy Sites](#)
(on the Mono Lake Committee's website)



View of the South [Tufa](#) at Mono Lake with the Sierra Nevada mountains in the background.

(photo courtesy of the Mono Lake Committee)

Temporary Link: [Capsule Summary](#) of Chapter 4

Extra Background on the Tucannon Salmon

The salmon pages provide additional information to supplement the introduction to the case in chapter 14 of the book. The additional background will be useful if you conduct a class project to expand and improve the salmon model in chapter 14.

[Modeling the Life Cycle](#) (a large file)
[Graphical Analysis of the MSY](#)

Links to Related Websites:
[The US Army Corps of Engineers](#)
[The Bonneville Power Administration](#)
[The Northwest Power Planning Council](#)
[The Fish Passage Center](#)
[Northwest Fish Newsletter](#)
[list of sites](#) (by Corps of Engineers)



The Chinook Salmon, Freshwater Phase.
The top fish is a male; the lower fish a female.
(photo courtesy of US Fish and Wildlife,
via the website of the US Army, Corps of Engineers)

Student Suggestions for a One Semester Course on System Dynamics: Examples from *Modeling the Environment*

Andrew Ford
Program in Environmental Science and Regional Planning
Washington State University
<http://www.wsu.edu/~forda>

presentation to the

Systems Thinking and Dynamic Modeling Conference 2000
A Conference for K-12 Education
Skamania Lodge, Stevenson, Washington
June 25, 2000

Student Suggestions:	start with Stella ASAP	simulate a real problem early	causal loop diagrams are harder than they look.	competitions are fun.	class project is where we "put it all together"
My Response:	in the lab by 2nd class	Mono Lake by 7th class	they can wait till the students know more	at least two competitions	student teams improve an existing model