HITCHHIKER'S GUIDE TO FORECASTING SALMON WITH OCEAN CONDITIONS

M. Trudel, S. Tucker, A. Araujo, S. Baillie, C. Parken (DFO)
&
B. Peterson (NOAA)

The “art” of forecasting salmon at DFO

Return Year	Forecast	Return
2009	10 million	1.7 million
2010	10 million	29 million
2011	3.2 million	5.1 million

=> Forecast Range in 2011: 1-10 million

The Trilogy in Five Volumes:

Tome 1: Linear regressions

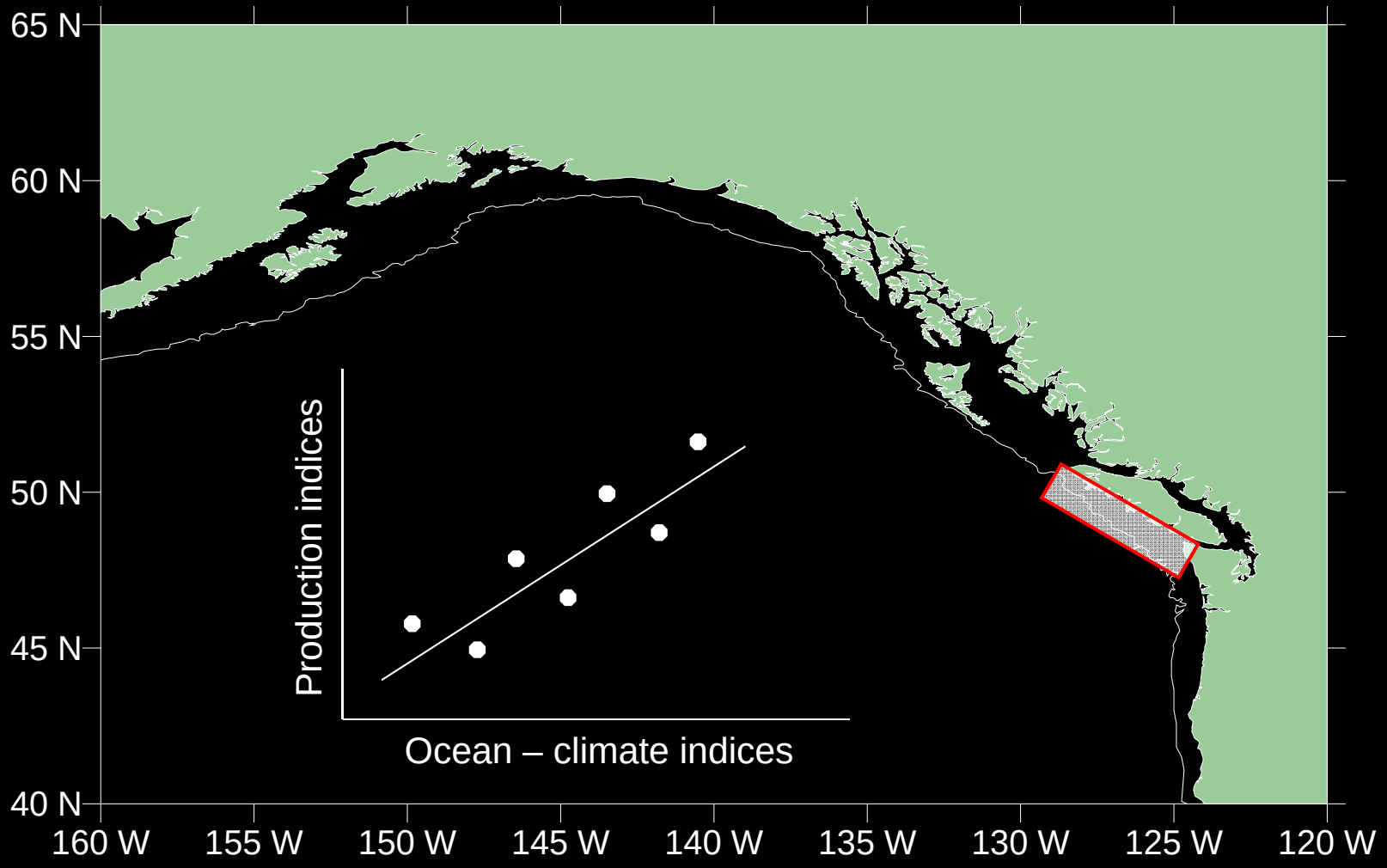
Tome 2: Stoplight chart

Tome 3: Multivariate statistics

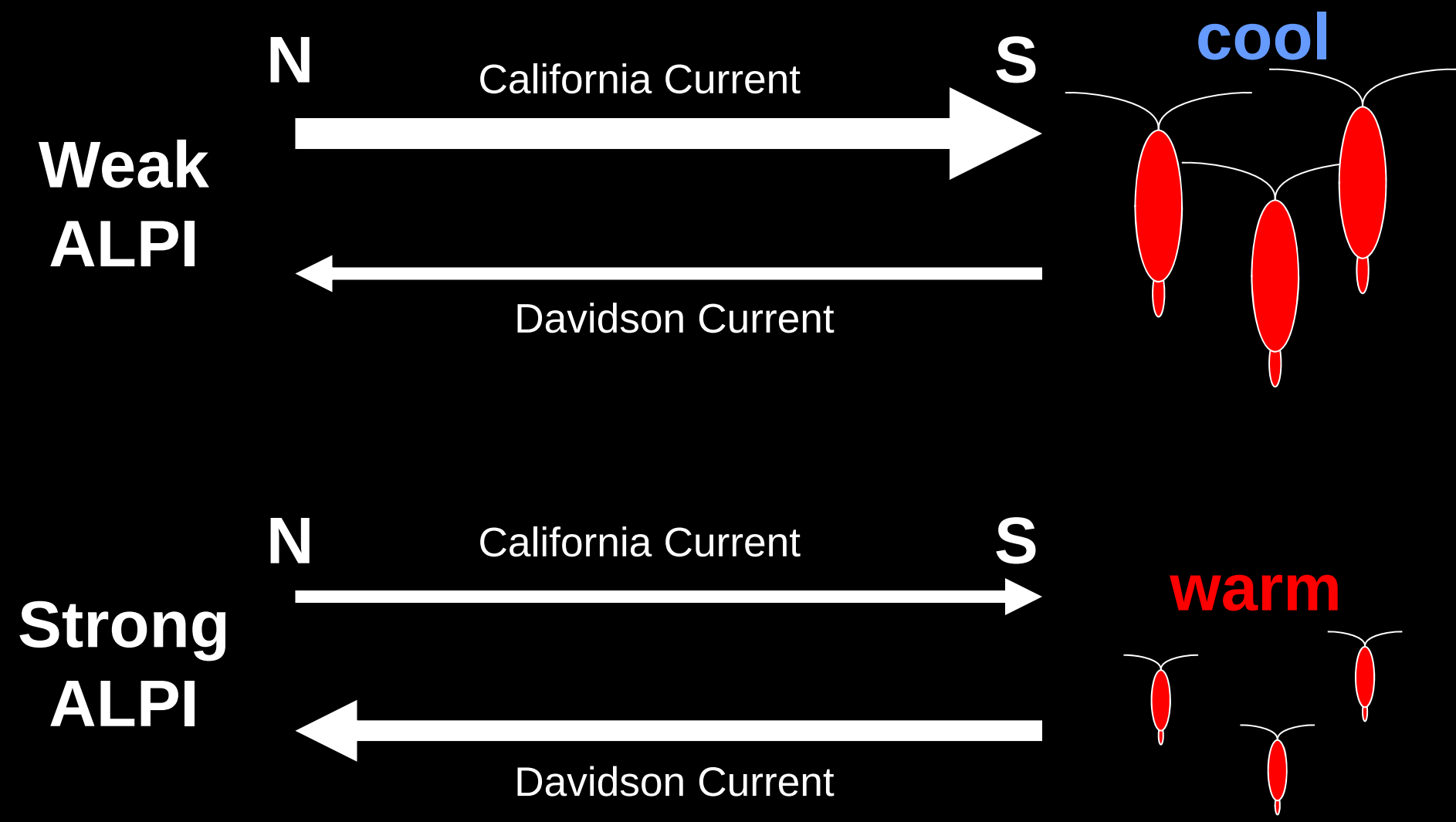
Tome 4: Bayesian Beliefs Network

Tome 5: The Life, the Universe, & the Everything

Tome 1: Linear Regression

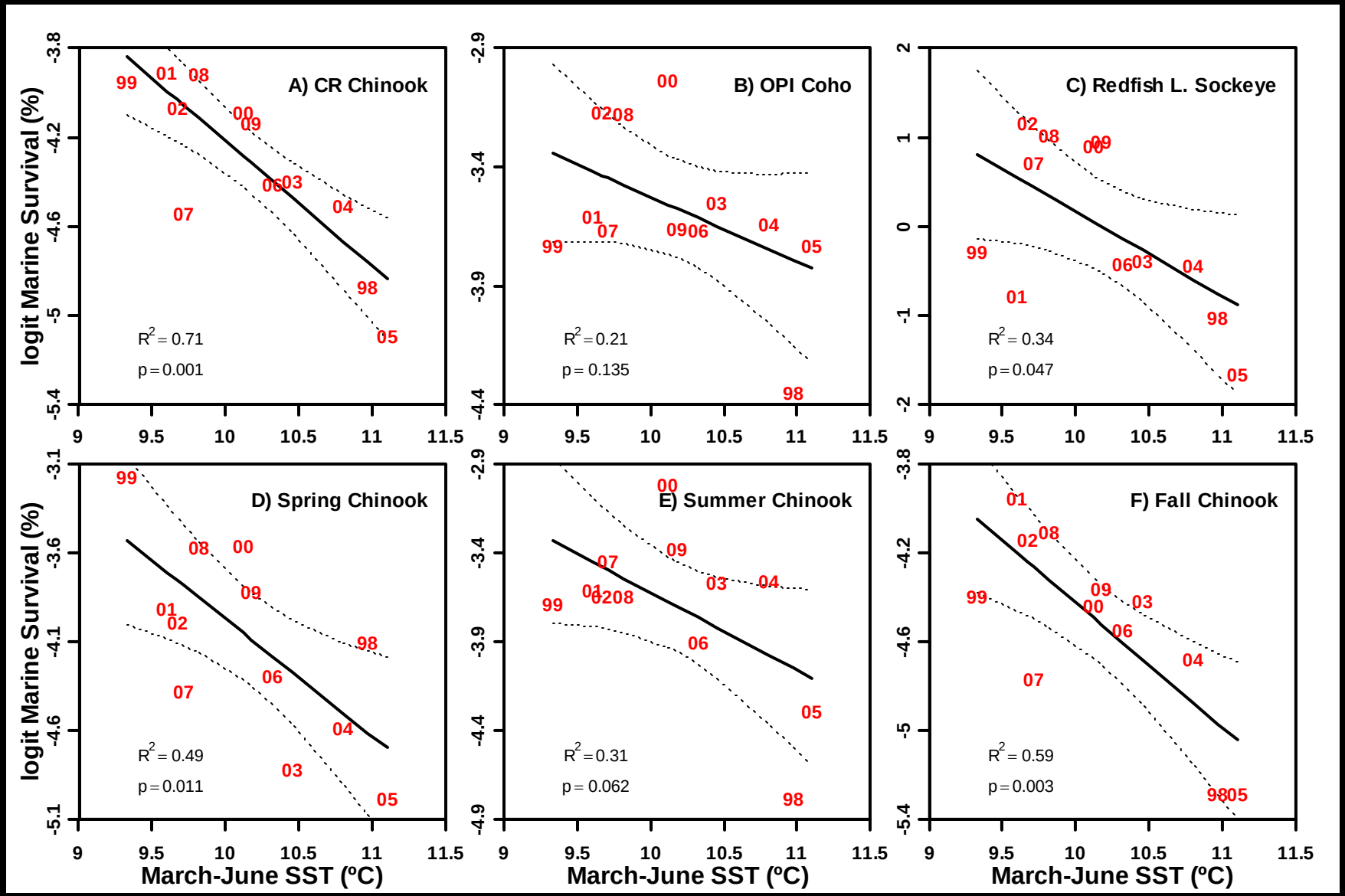


Have a conceptual model in mind

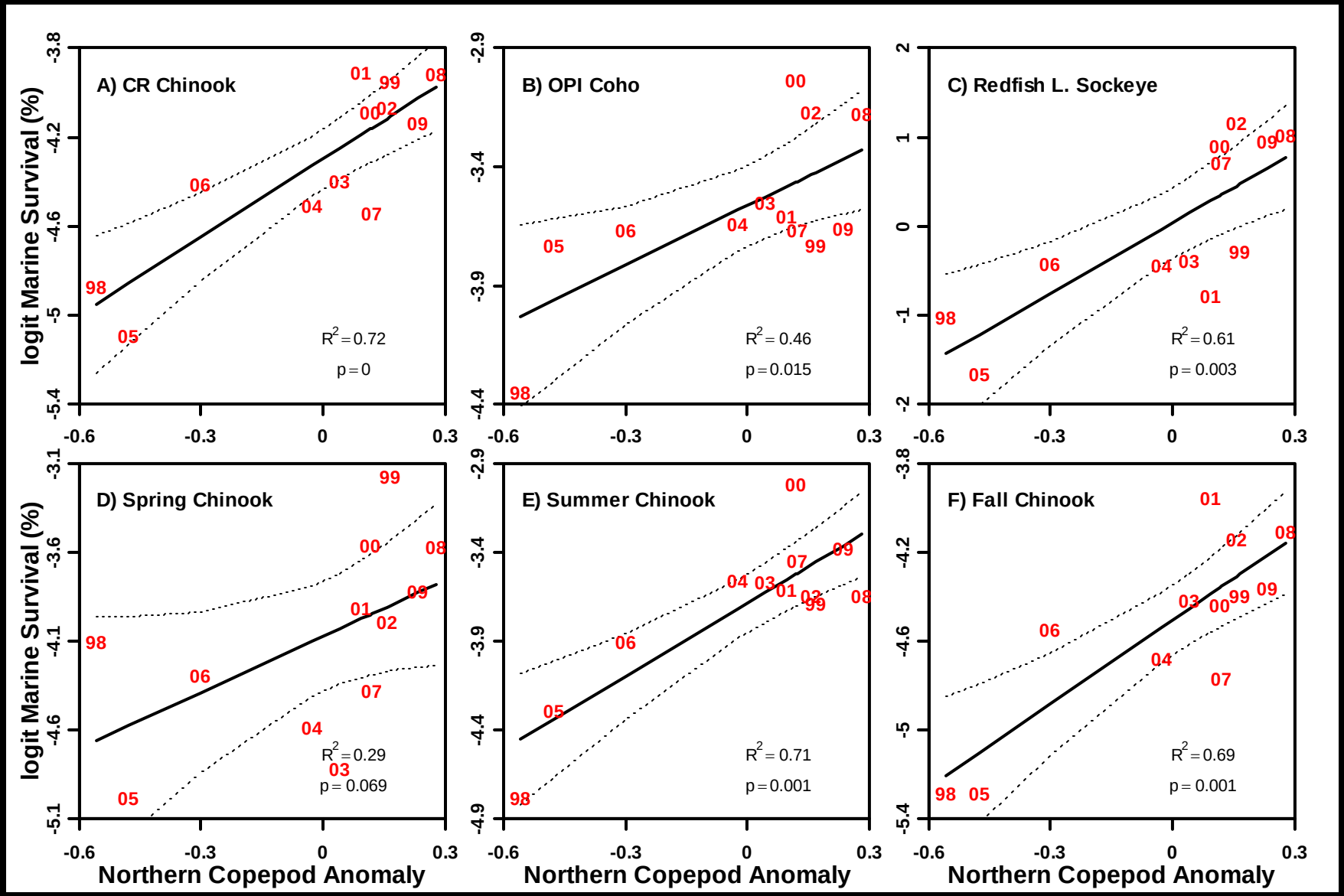


Adapted from Mackas, Batten, Trudel (2007) Progress in Oceanography 75: 233-252.

Survival & Sea Surface Temperature



Survival & Northern Copepods

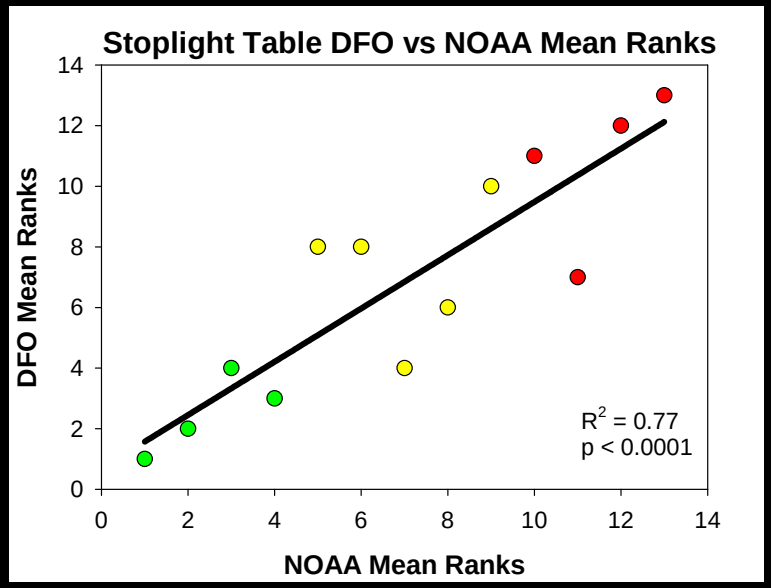


Tome 2a: NOAA Stoplight

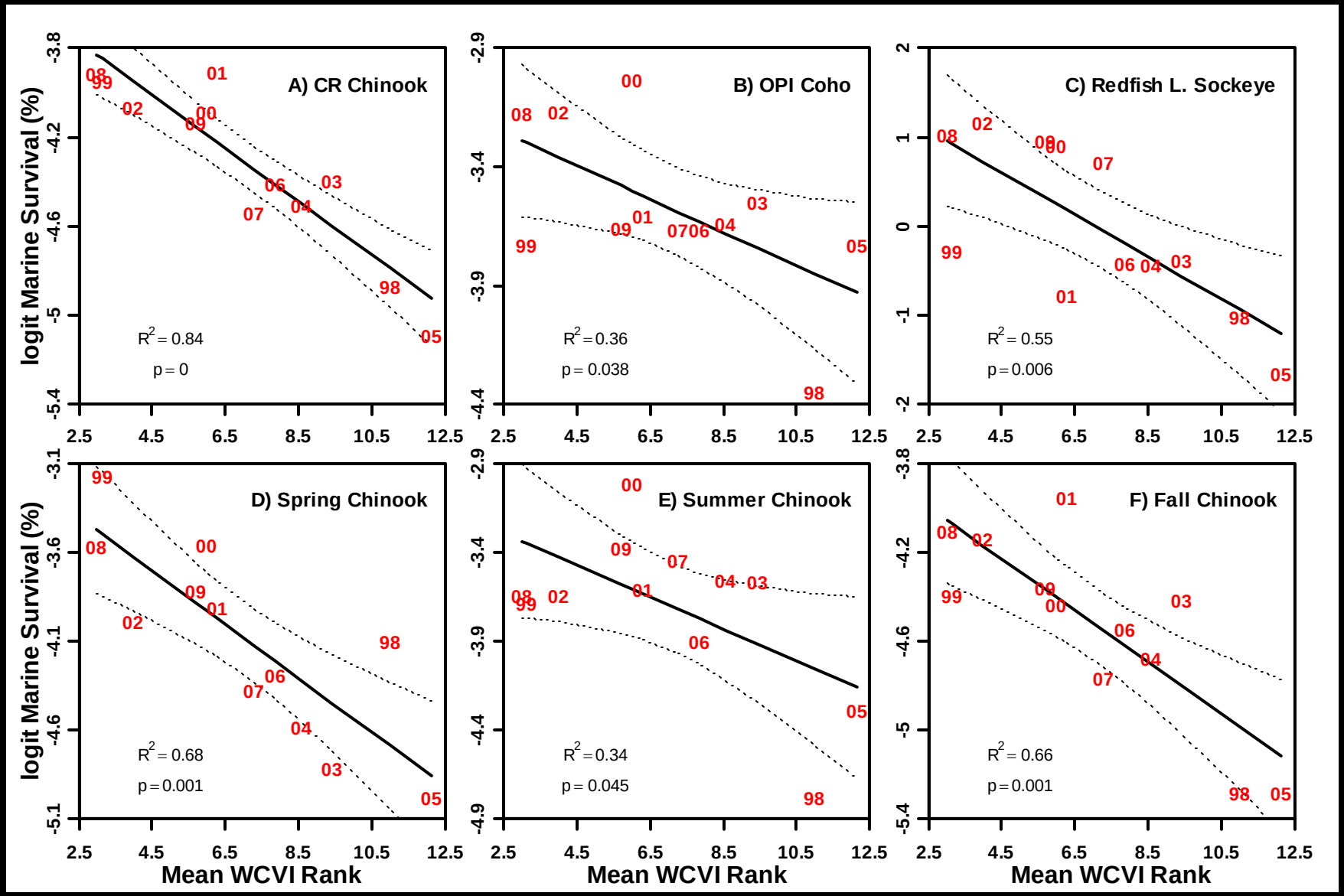
Ecosystem Indicators		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
PDO (December-March)		13	5	2	9	6	14	8	12	10	7	4	1	11	3
PDO (May-September)		8	3	5	4	9	13	12	14	10	11	1	7	6	2
ONI Jan-June		14	1	1	5	10	11	9	12	6	8	3	7	13	4
SST at 46050 (May-Sept)		12	8	3	4	1	7	14	11	5	13	2	9	6	10
SST at NH 05 (May-Sept)		8	4	1	6	2	5	14	11	7	13	3	12	10	9
SST winter before (Nov-Mar)		14	11	3	5	7	10	12	9	8	2	1	4	13	5
Physical Spring Trans (UI Based)		3	6	13	12	4	9	11	14	9	1	5	2	7	8
Upwelling Anomaly (Apr-May)		7	1	12	3	6	10	9	14	7	2	4	5	11	12
Length of upwelling season (UI Based)		6	2	13	9	1	10	8	14	5	3	7	3	11	12
Deep Temperature at NH 05		14	4	6	3	1	9	10	11	12	5	2	8	7	13
Deep Salinity at NH05		14	3	6	2	5	12	13	8	7	1	4	10	11	9
Copepod Richness Anomaly		14	2	1	5	4	10	9	13	11	8	6	7	12	3
N.Copepod Anomaly		13	9	5	6	3	12	11	14	10	8	2	7	4	1
Biological Transition		13	9	6	5	7	12	8	14	11	2	1	4	10	3
Copepod Community structure		14	4	3	6	1	10	11	13	12	8	2	5	9	7
Winter Ichthyoplankton		14	6	2	4	5	13	12	8	11	10	1	7	3	9
Catches of salmon in surveys															
June-Chinook Catches		13	2	3	11	7	9	12	14	8	6	1	4	5	10
Sept-Coho Catches		10	2	1	4	3	6	11	13	8	9	7	14	12	5
Mean of Ranks		11.3	4.6	4.8	5.7	4.6	10.1	10.8	12.2	8.7	6.5	3.1	6.4	8.9	6.9
RANK of the mean rank		13	2	4	5	2	11	12	14	9	7	1	6	10	8

Tome 2b: DFO Stoplight

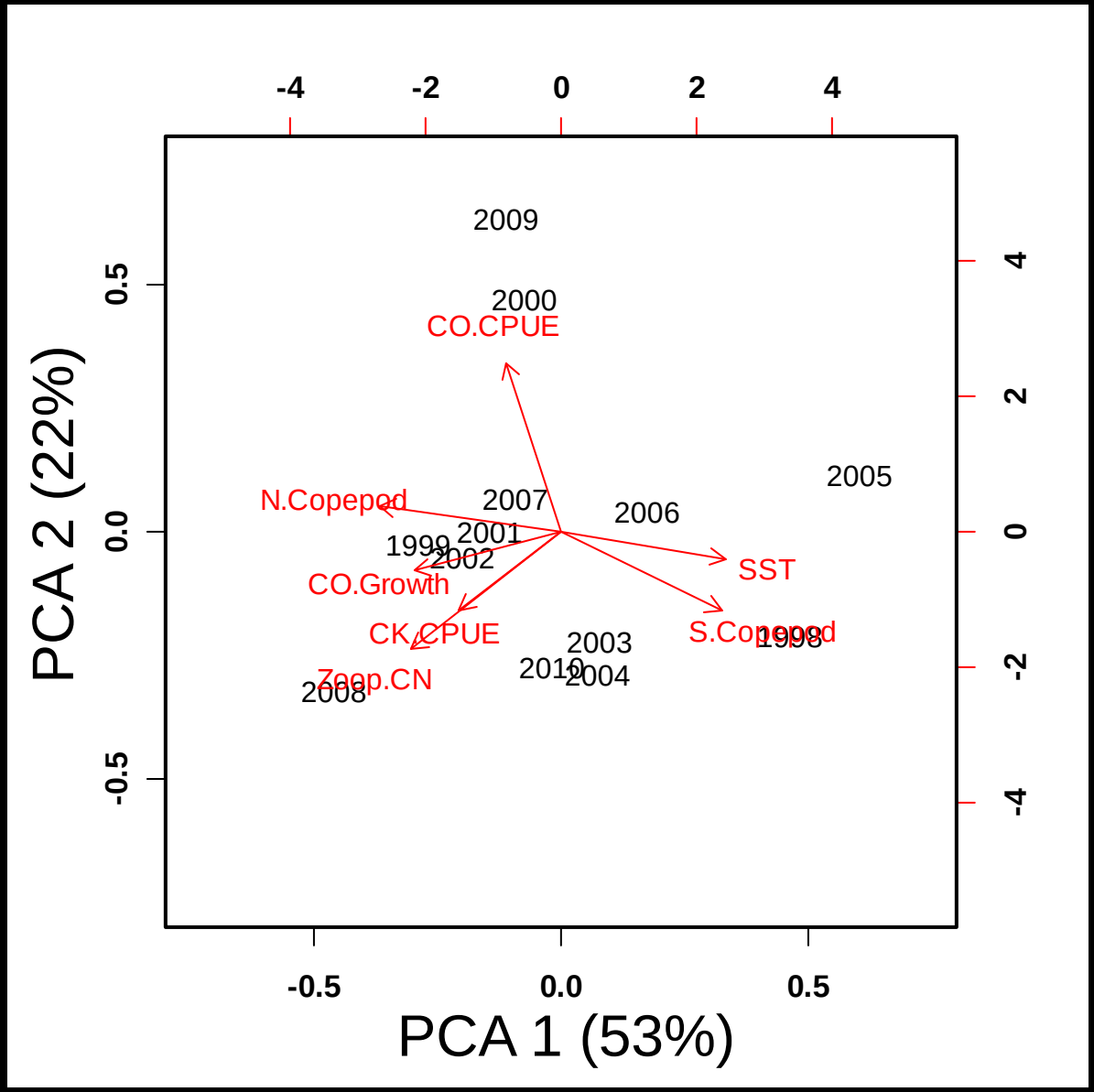
RANK SCORES													
Environmental Variables	***1998***	***1999***	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Online data													
Mean SST - WCVI (Amphitrite) - Mar-Jun	12	1	6	2	3	9	11	13	8	4	5	7	10
Survey data - Zooplankton													
C:N Zooplankton Ratio (WCVI)	12	5	11	6	4	7	2	13	9	8	1	10	3
Northern (Boreal) Copepods	13	3	6	8	4	9	10	12	11	5	1	2	7
Southern Copepods	13	6	7	5	4	12	9	11	10	3	2	1	8
Survey data - Fish													
Coho Growth	12	1	3	7	2	8	4	13	9	10	6	11	5
WCVI CR CK CPUE - Jun-Jul	4	2	7	10	5	9	11	12	6	13	1	8	3
WCVI sockeye CPUE - Jun-Jul	8	5	4	11	13	2	3	12	9	6	1	7	10
WCVI coho CPUE - Jun-Jul	9	4	2	6	7	12	13	11	3	8	5	1	10
Mean Rank	10.1	3.7	5.7	7.6	5.6	8.4	7.4	12.0	8.1	7.6	2.4	5.7	6.6
Rank of Mean Ranks	12	2	4	8	3	11	7	13	10	8	1	4	6



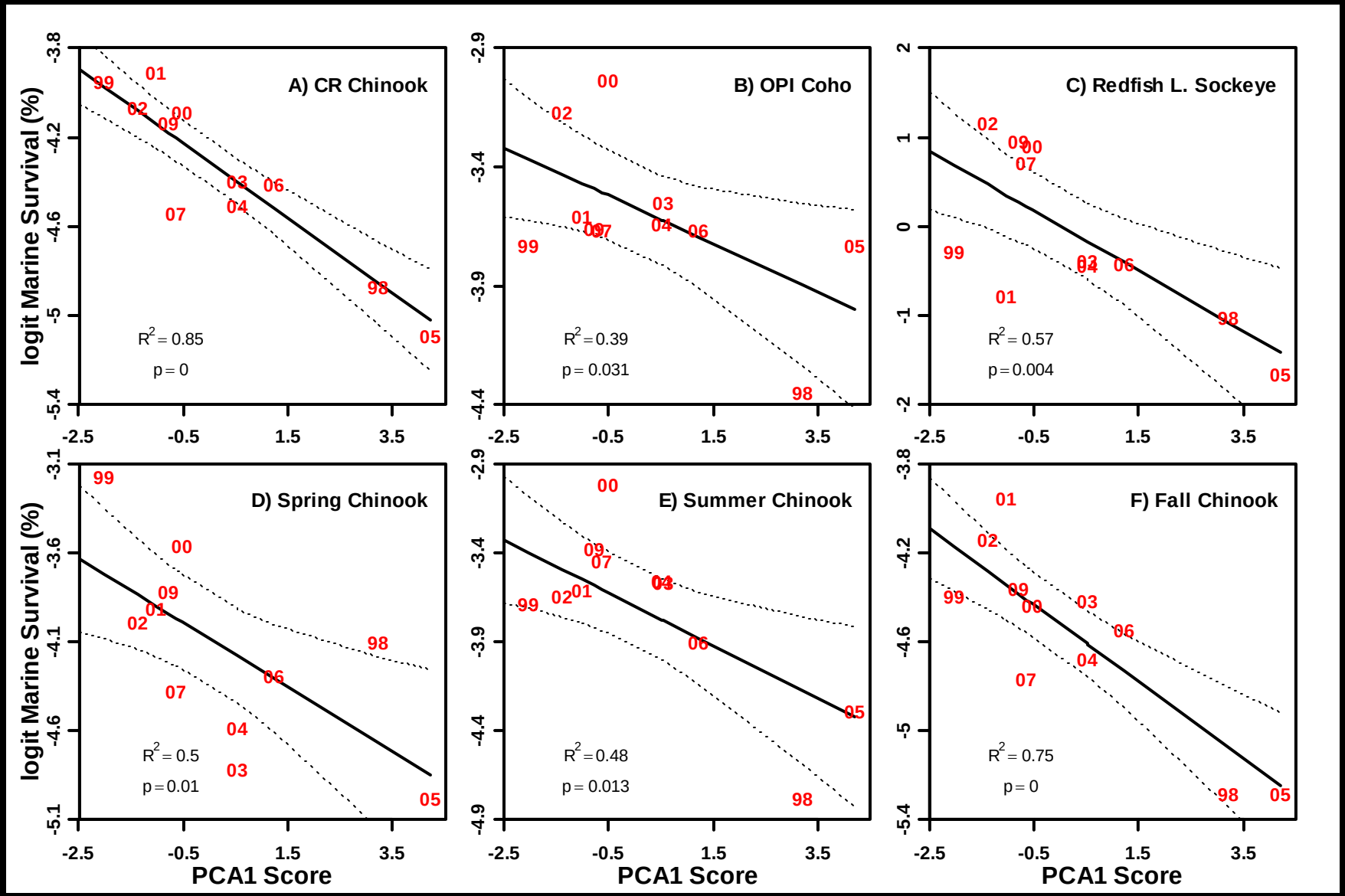
Survival & Mean Rank



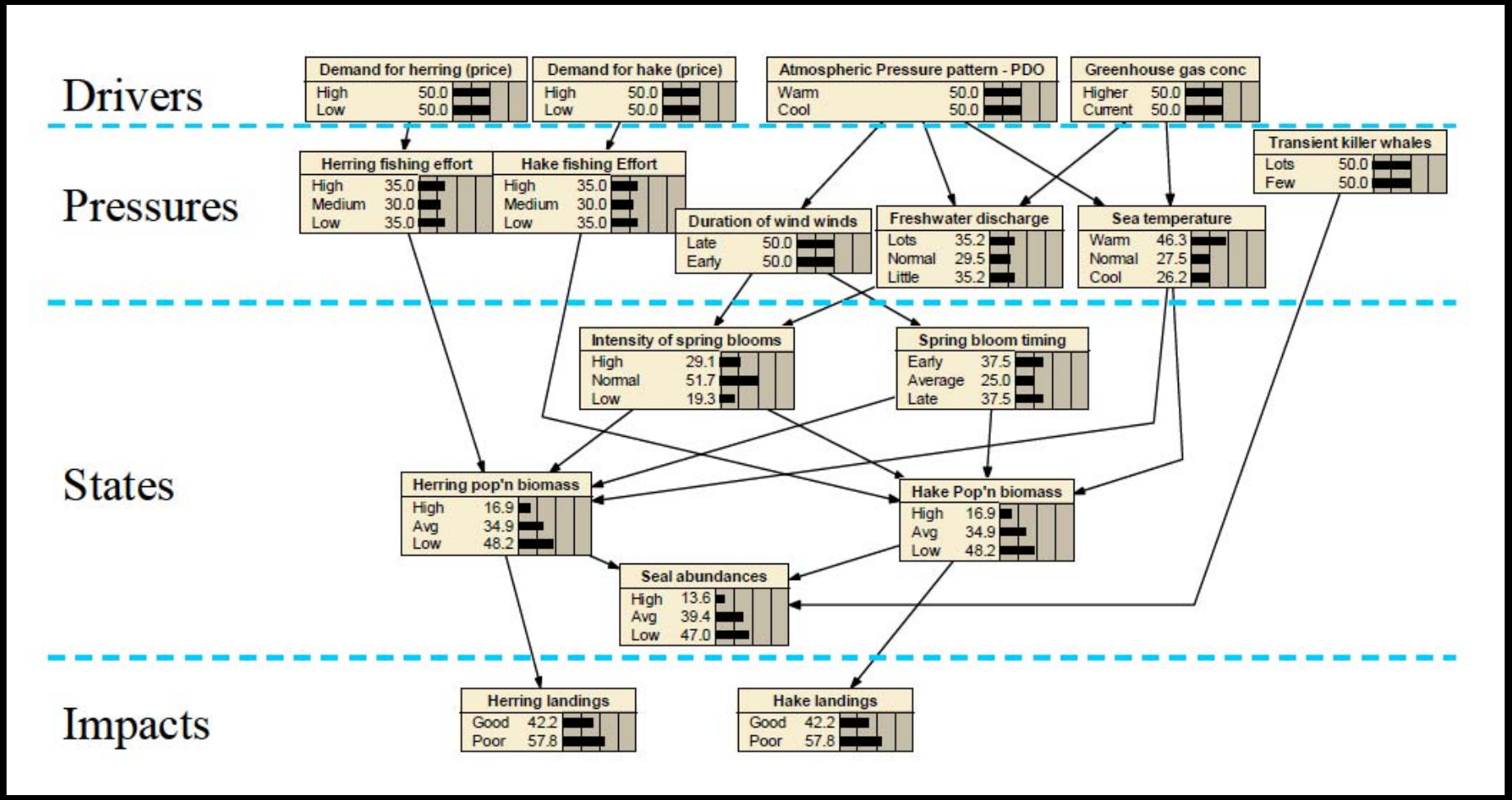
Tome 3: Multivariate Statistics



Survival & Principal Component

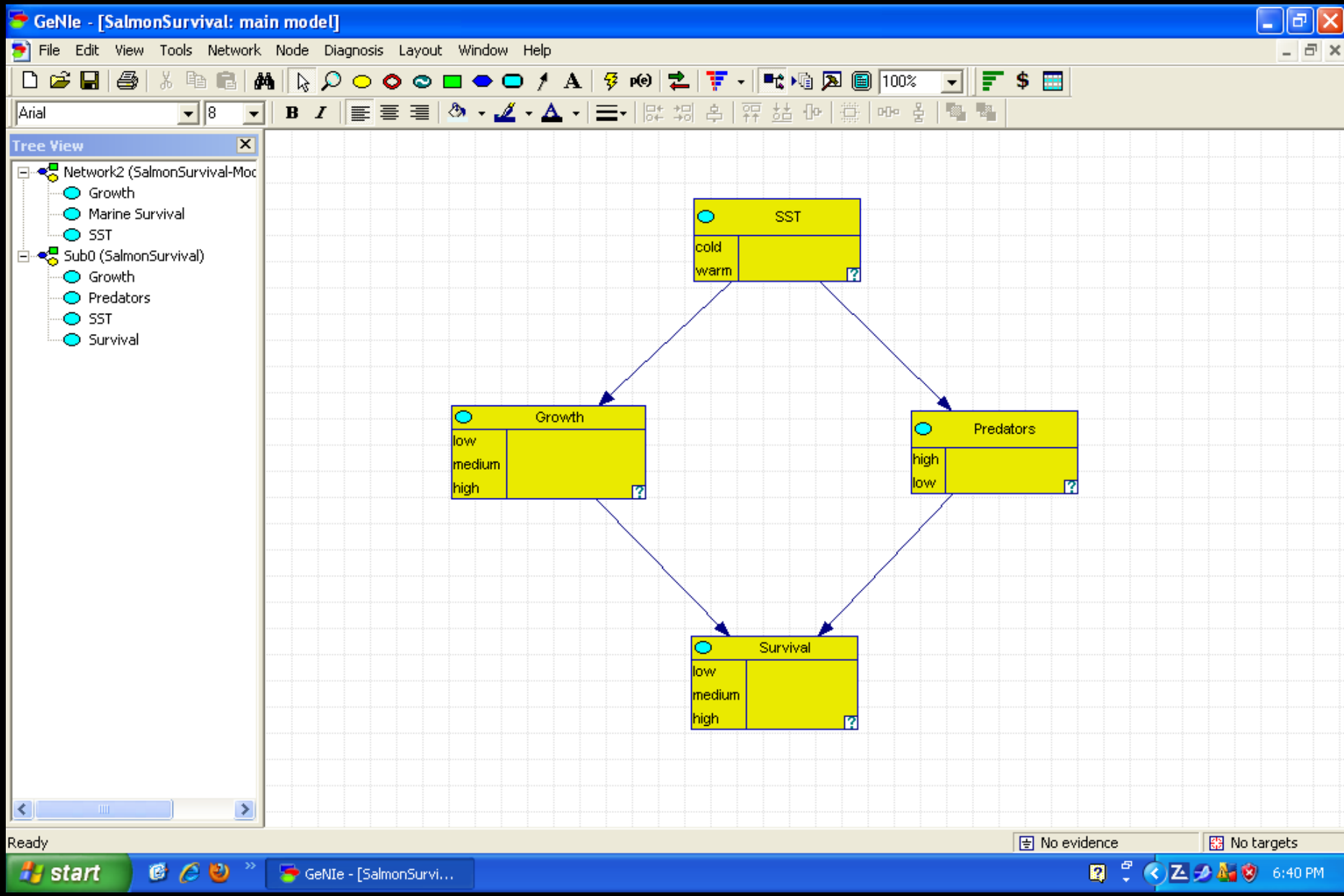


Tome 4: Bayesian Beliefs Network



R.I.Perry (unpublished)

A Simple Hypothetical BBN



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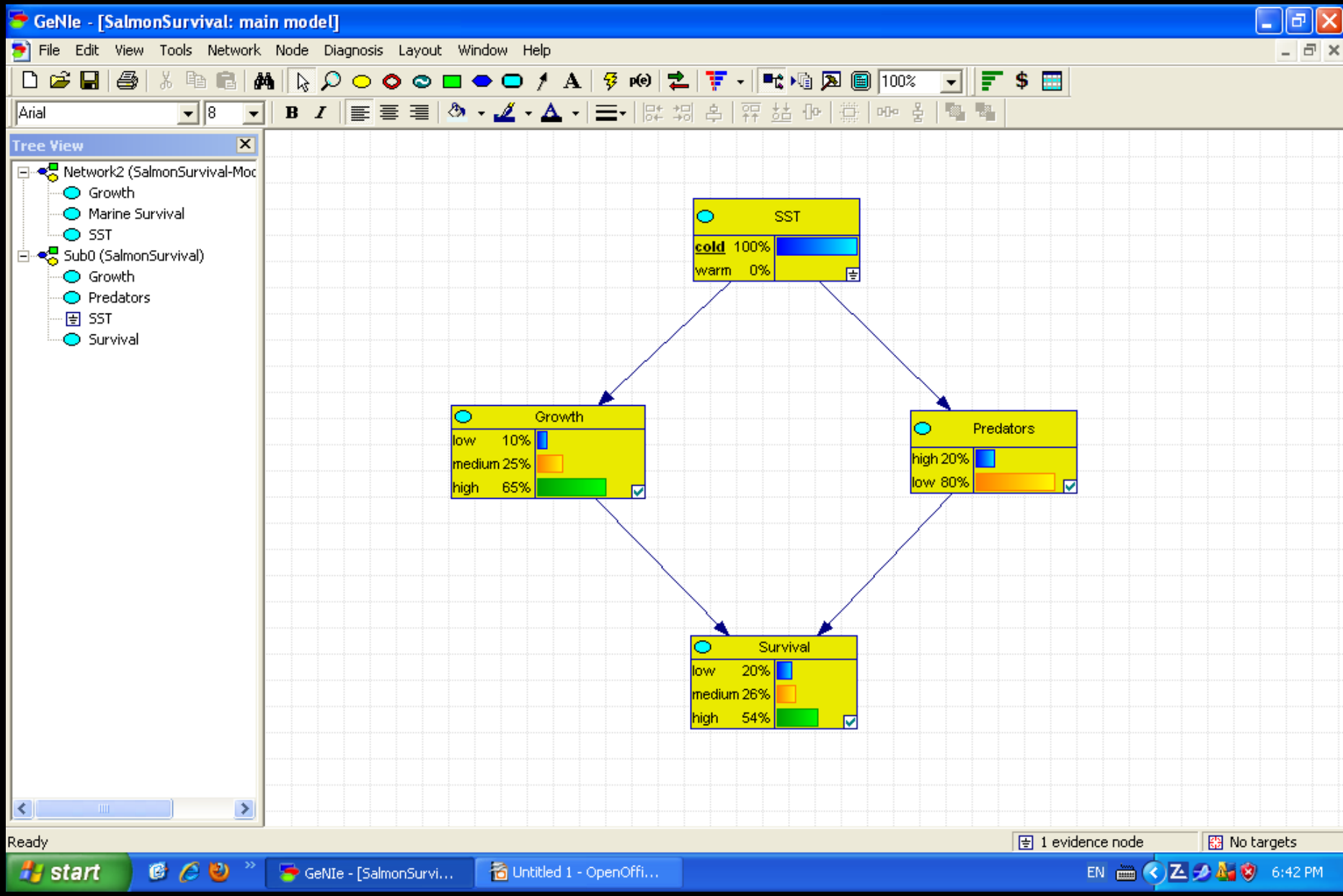

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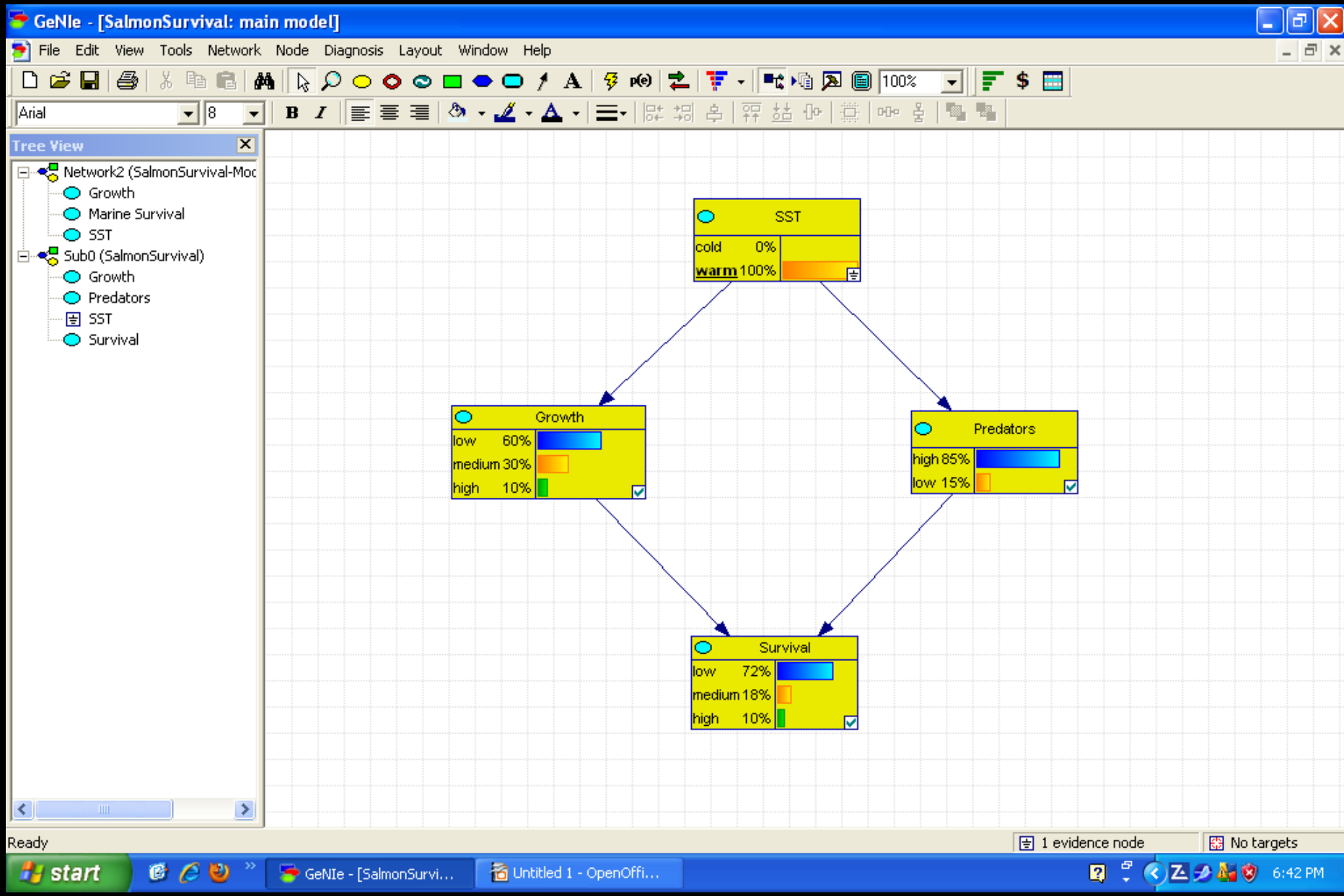

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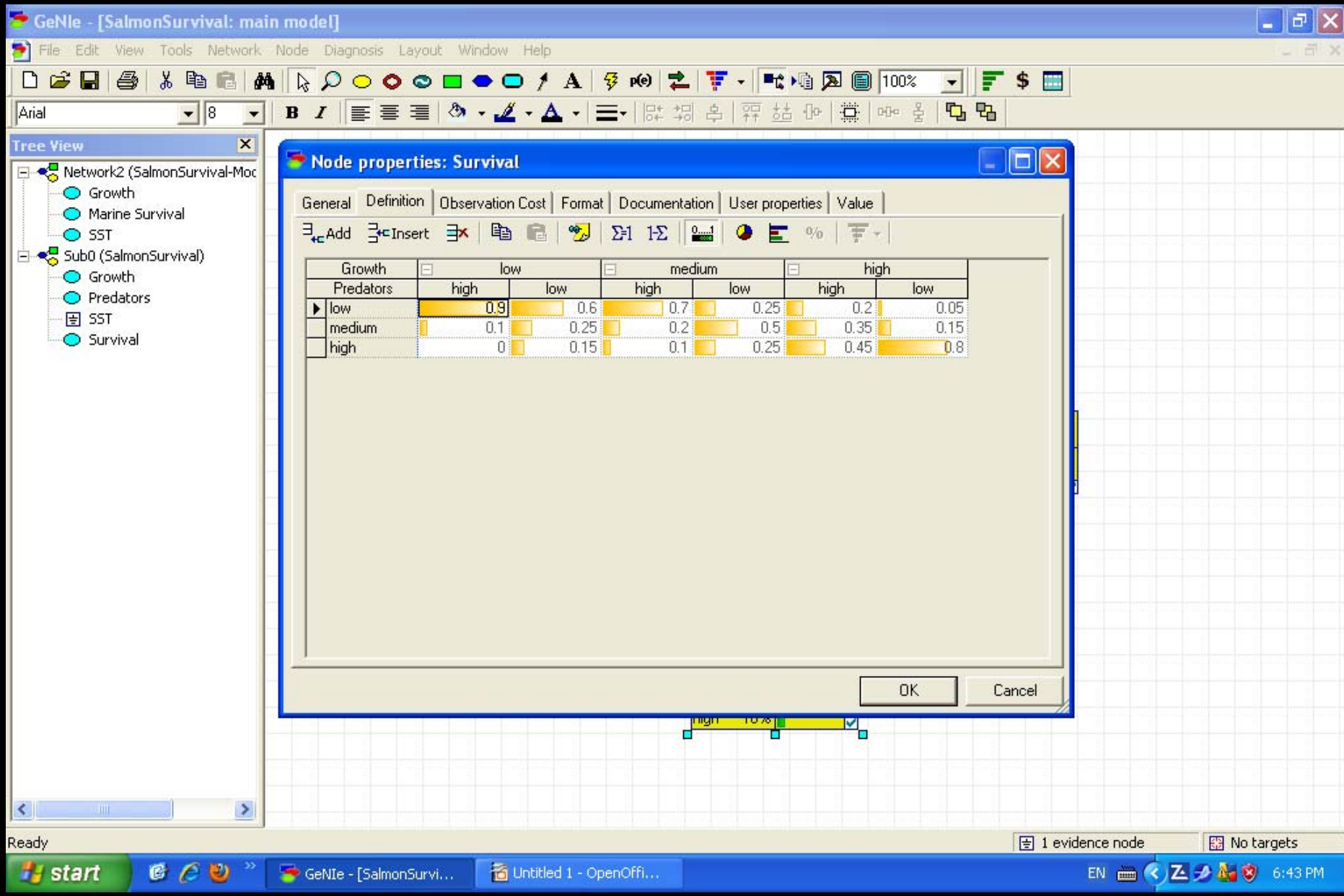
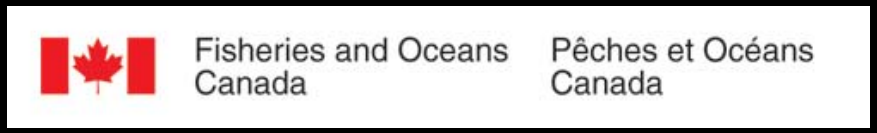


Tome 5: The Life, the Universe, & the Everything

1. Good smolt and adult data
2. Know where the fish go
3. Have some conceptual model in mind
4. Take advantage of online data
5. Be prepared: correlation breaks over time
6. Don’t be married to a single approach



SO LONG, AND THANKS
FOR ALL THE FISH