

Non-Monetary Compensation Policy For Beach Closure: An Application Using the Random Utility Model

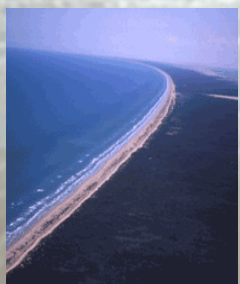
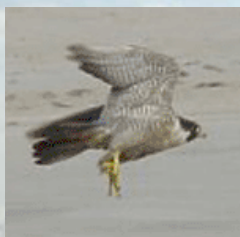
Ami K Kang & George R. Parsons
Marine Policy Program University of Delaware
Estuarine Research Federation Conference, RI
5th Nov. 2007



Purpose

To develop travel cost random utility models for beach choice and to estimate use values of beach closures in monetary and *non-monetary* terms on the Gulf coast of Texas

Study Area: Padre Island National Seashore line



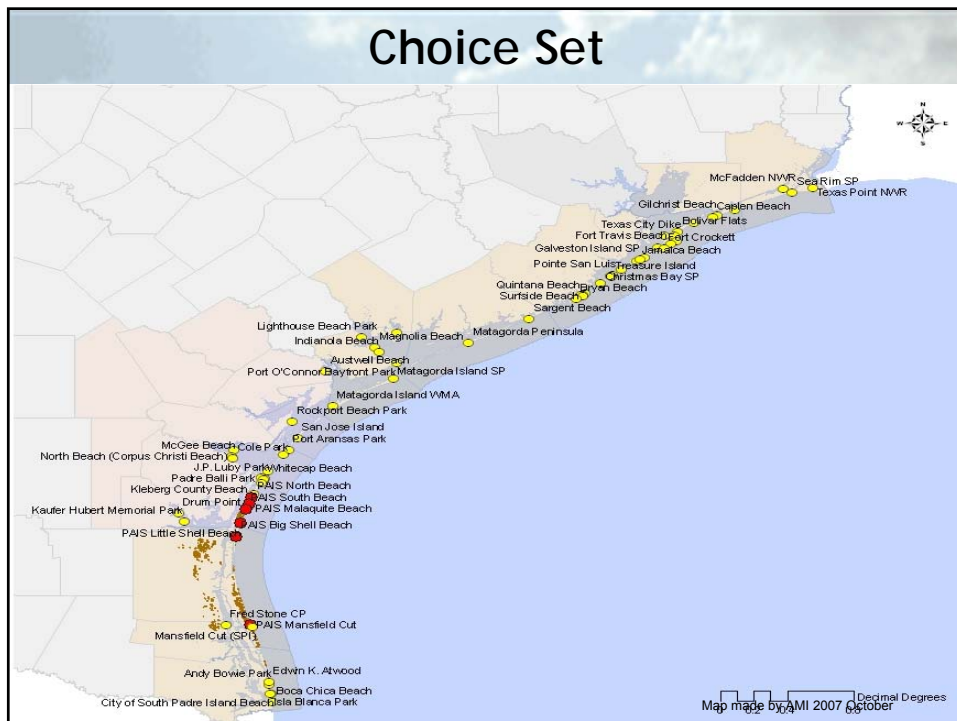
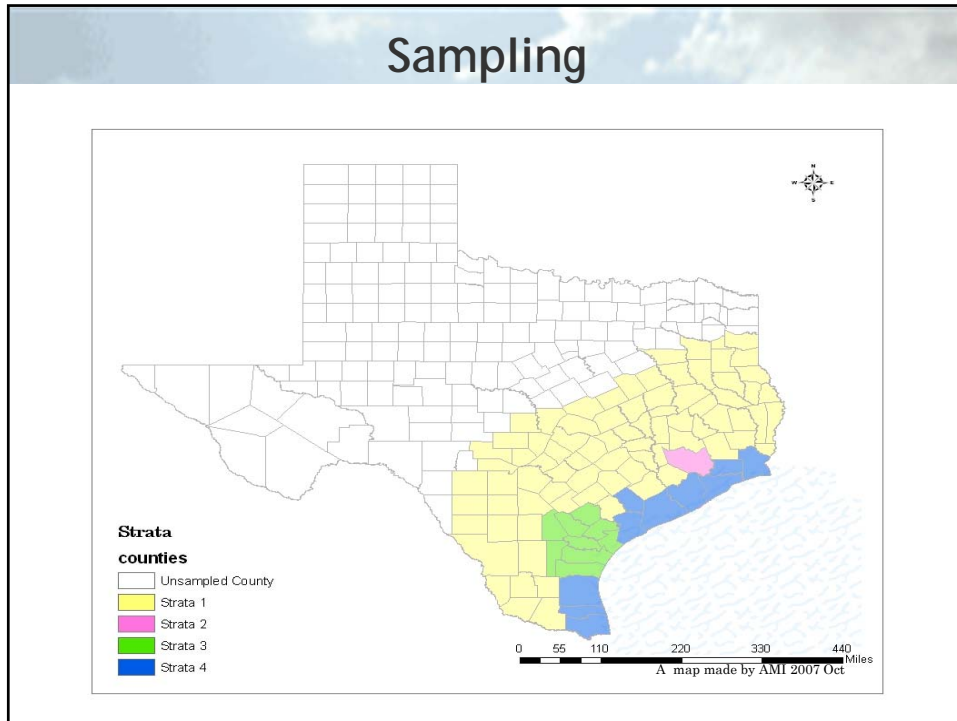
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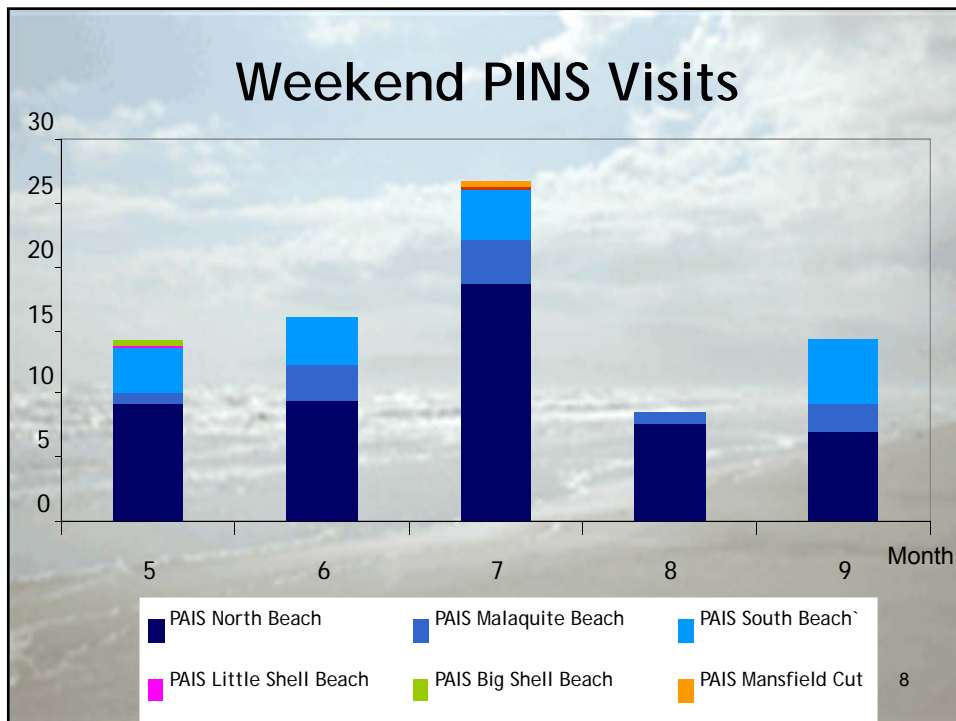
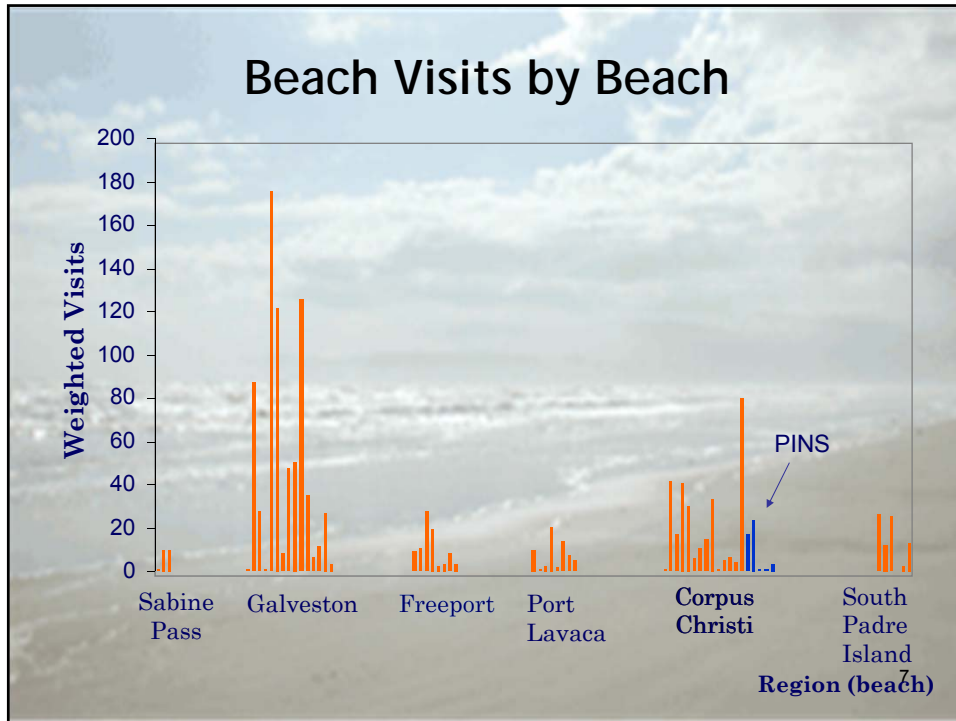
Source: <http://www.nps.gov/pais/naturescience/coasts.htm>

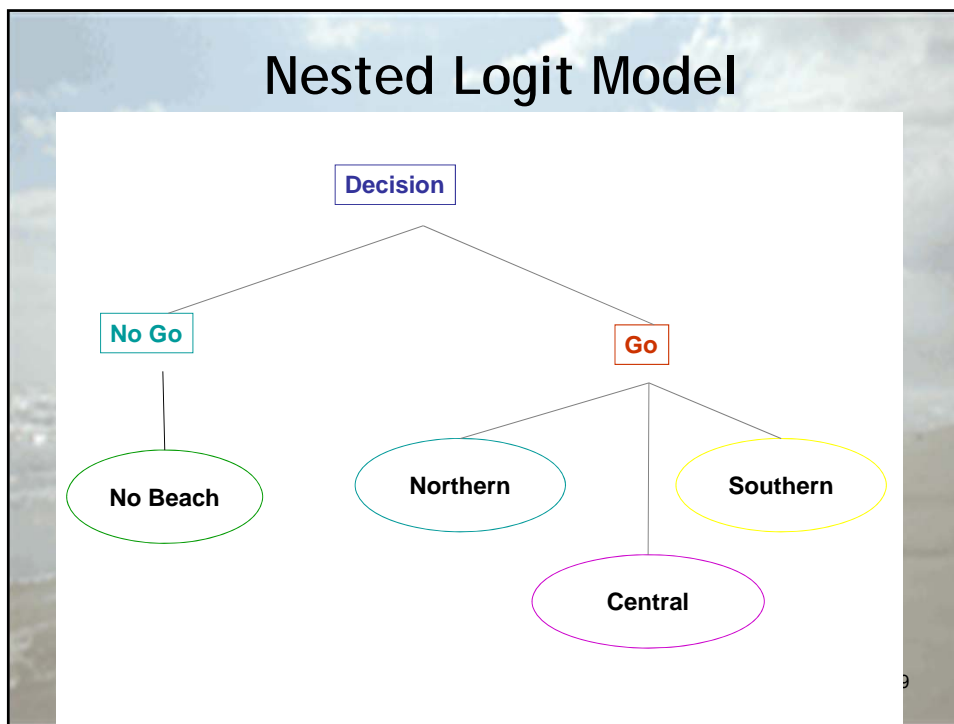
Welfare Measurement

- Demographic Information
- Beach Site Characteristics
- Beach Choice Information
- Beach Trip Date-Month, Weekday/Weekend
- Nested Logit Model (Random Utility Model)

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Estimated Coefficients of Household Characteristics

Variable	Estimate	Std.Err	Variabe	Estimate	Std.Err
Weekend	-1.20	0.06	Owning a beach property	-0.25	0.11
Child	-0.10	0.06	Owning a boat	-0.36	0.07
Log(Age)	0.33	0.10	Owning a pool	0.30	0.08
Retired	-0.16	0.14	Owning a surfing equipment	-0.07	0.06
Spanish	-0.20	0.10	June	0.15	0.08
HighSchool	0.17	0.08	July	0.27	0.09
College	-0.10	0.08	August	0.20	0.09
Graduate	-0.30	0.11	September	0.94	0.12
Full tile job	-0.15	0.07	Constant	5.12	0.48
Woman	0.09	0.06			

Estimated Coefficients of Site Characteristics

variable	Estimate	Std.Err	Variable	Estimate	Std.Err
Travel cost	-0.03	0.00	Concession	-0.48	0.10
Time	-0.15	0.06	Machine Cleaning	0.88	0.11
Time* Income	0.00	0.00	Manual Cleaning	0.49	0.13
Gulf coast	0.42	0.14	No-fishing	-0.14	0.12
Restroom	0.46	0.11	No-swimming	-0.58	0.24
Lifeguard	0.27	0.12	Remote	-0.28	0.12
Statepark	-0.01	0.23	Closing	-0.60	0.17
May_Padre	1.36	0.32	Vehicle free	0.42	0.13
June_Padre	1.75	0.32	Vehicle free area	0.48	0.14
July_Padre	2.49	0.30	Red tide	-0.97	0.22
August_Padre	1.13	0.40	Length	0.23	0.04
September_Padre	2.57	0.37			

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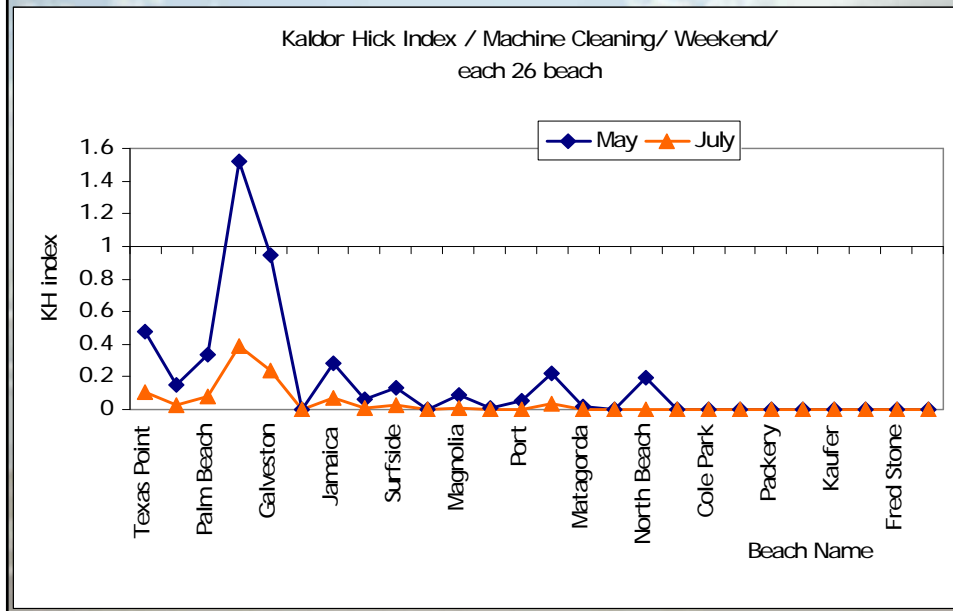
Criteria to Measure the Efficiency of Non-Monetary Compensation Policy

- ✓ The potential Kaldor-Hicks efficiency criterion : A winner can potentially compensate a loser.
- ✓ The ratio of population who are fully compensated

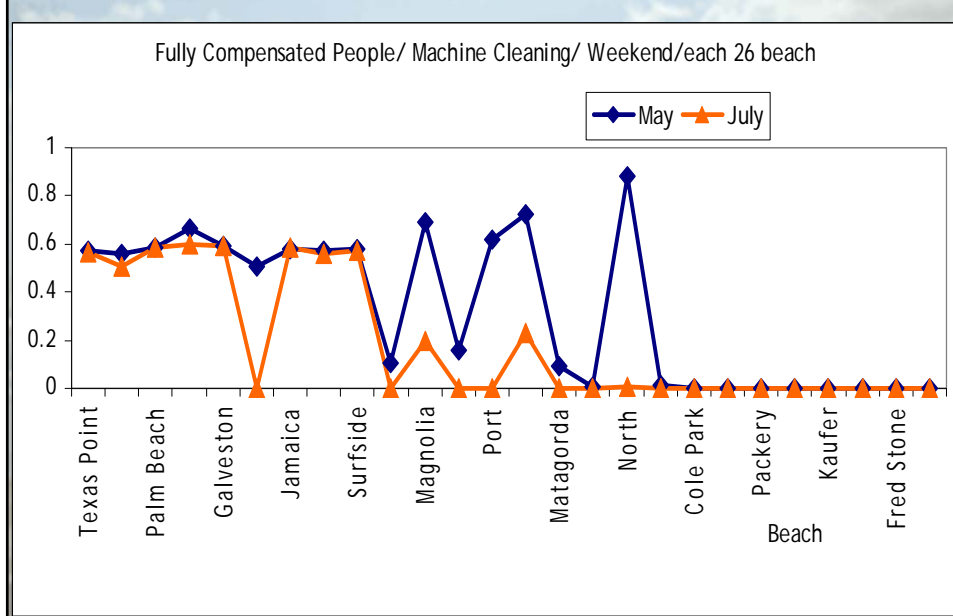


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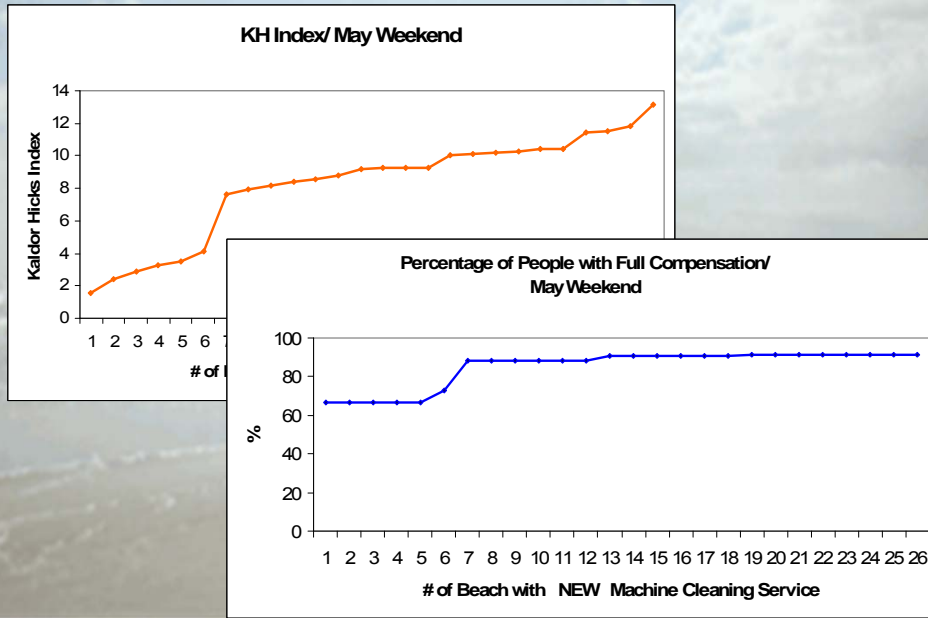
Policy Analysis: Machine Cleaning



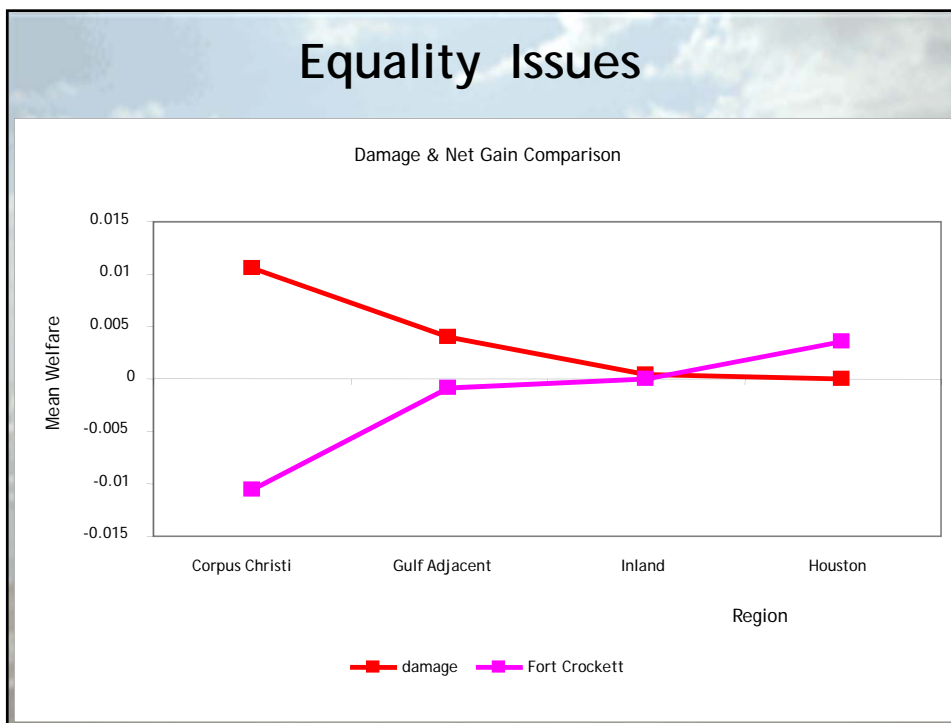
Policy Analysis - Machine Cleaning (Cont.)



Policy Analysis - Machine Cleaning (Cont.)



Equality Issues



Future work

- ✓ Estimating a Mixed Logit Model
- ✓ Estimating an Individual_Level Parameter Mixed Logit Model
- ✓ Coding a searching algorithm to suggest more efficient policy

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Thank You!

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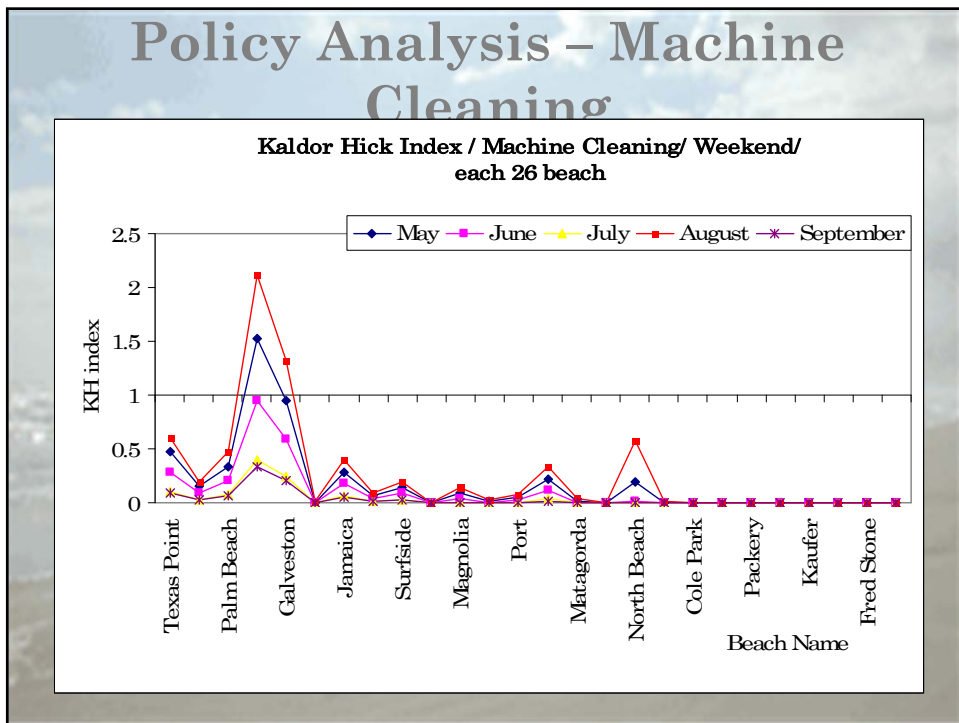
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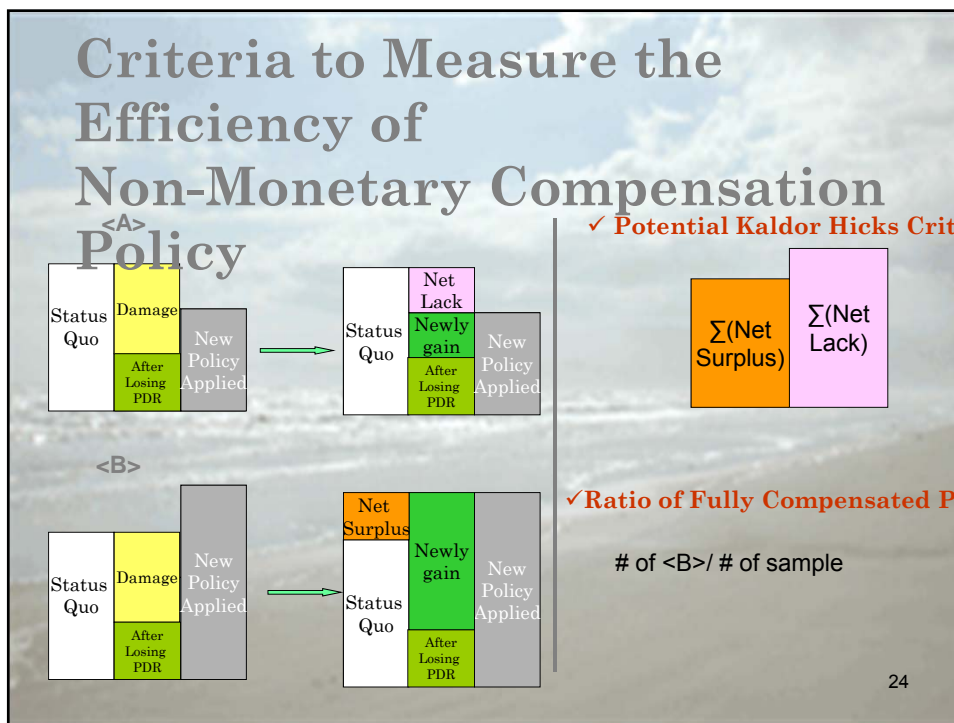
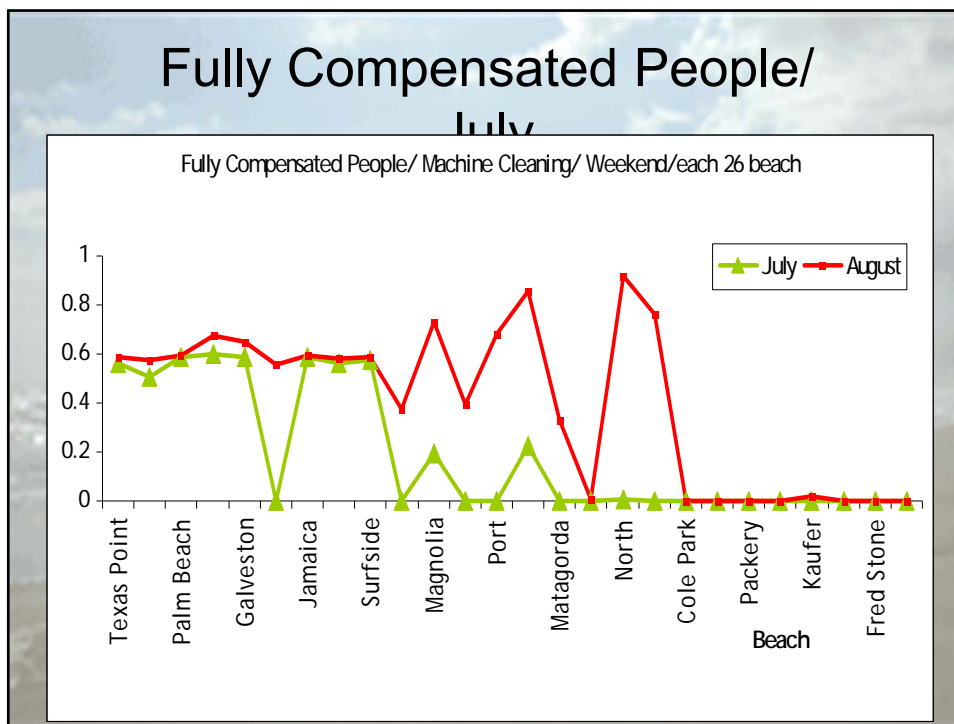


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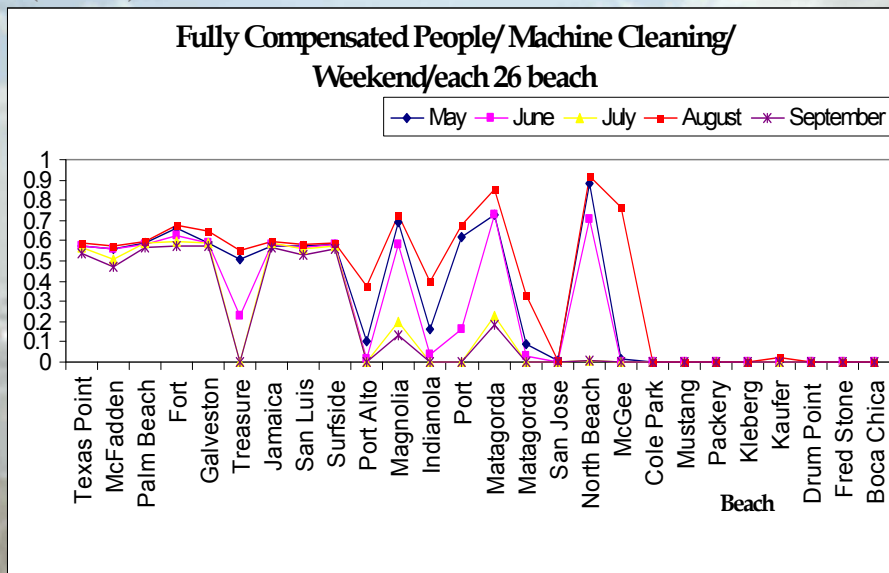


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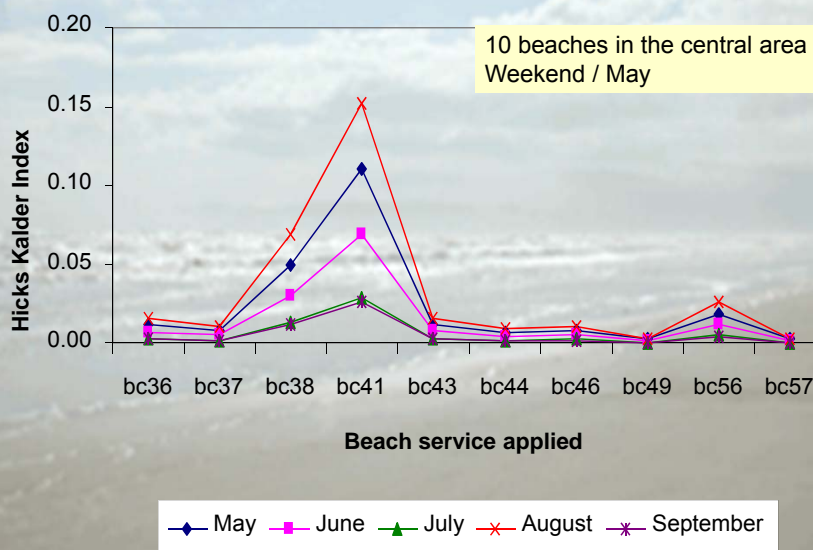


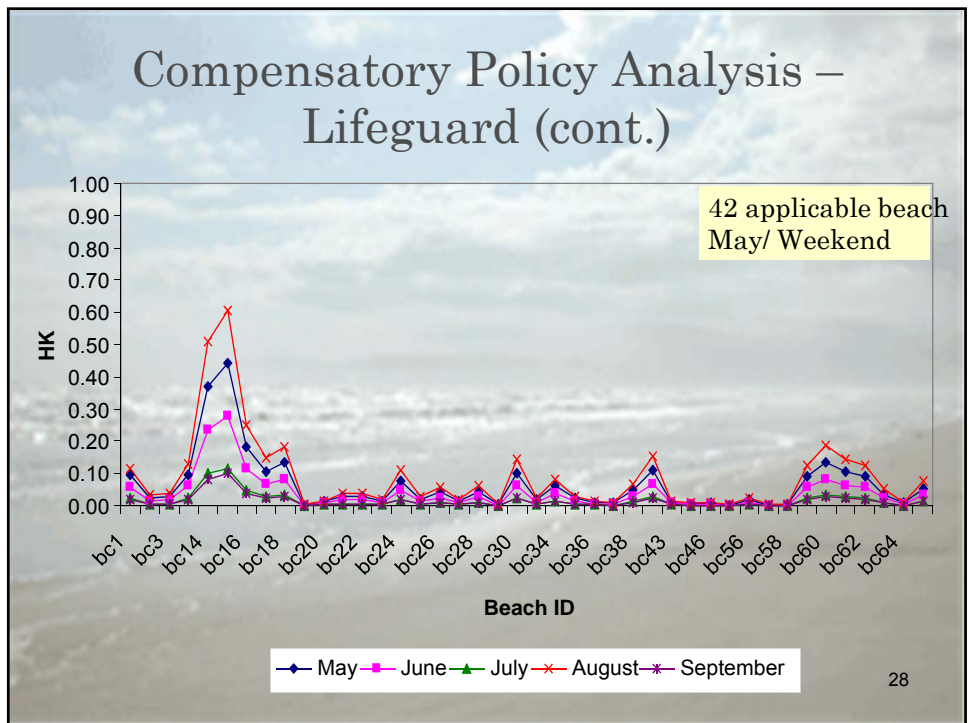
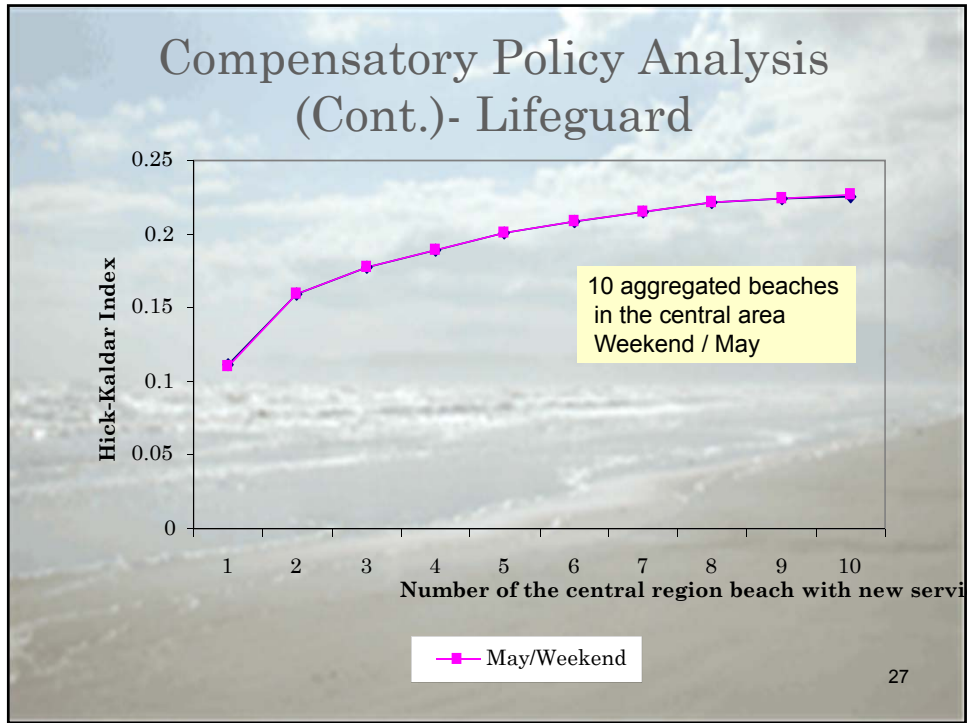


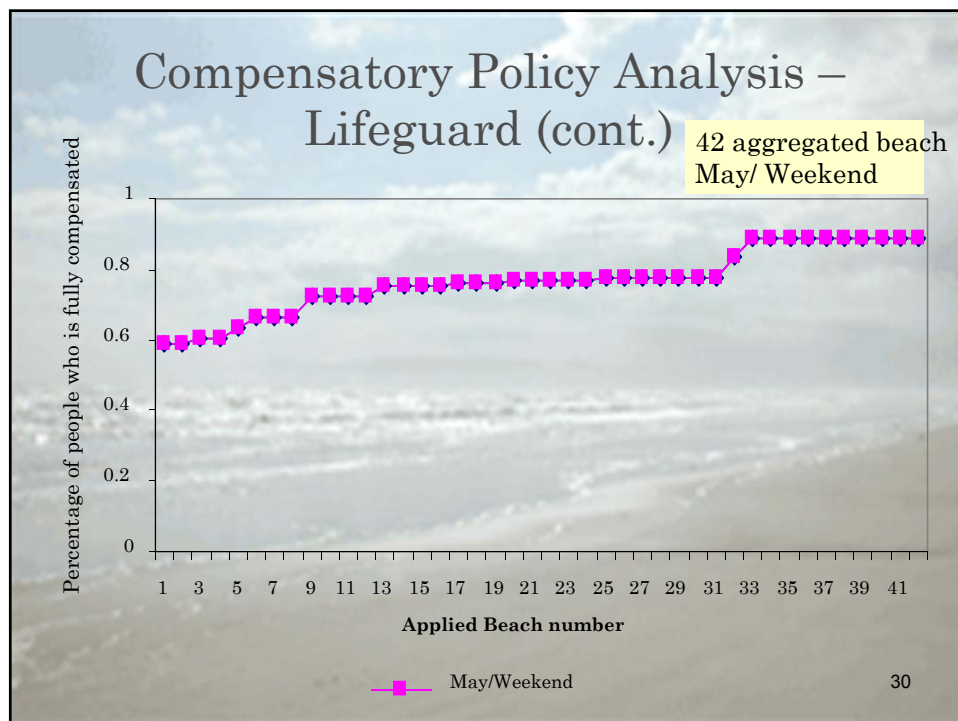
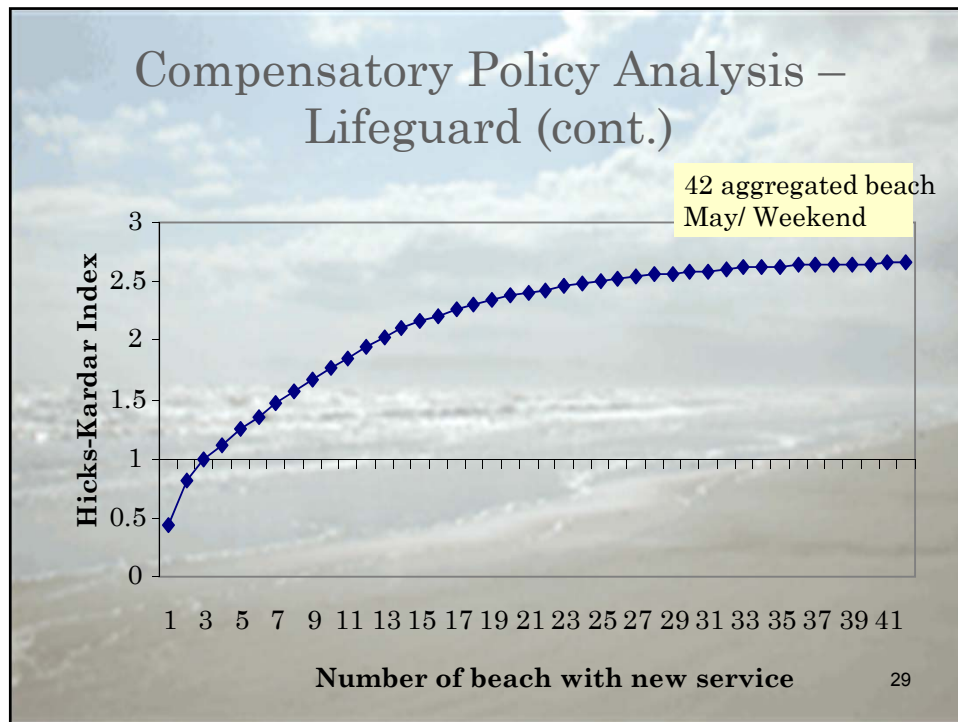
Policy Analysis – Machine Cleaning (Cont.)



Compensatory Policy Analysis - Lifeguard

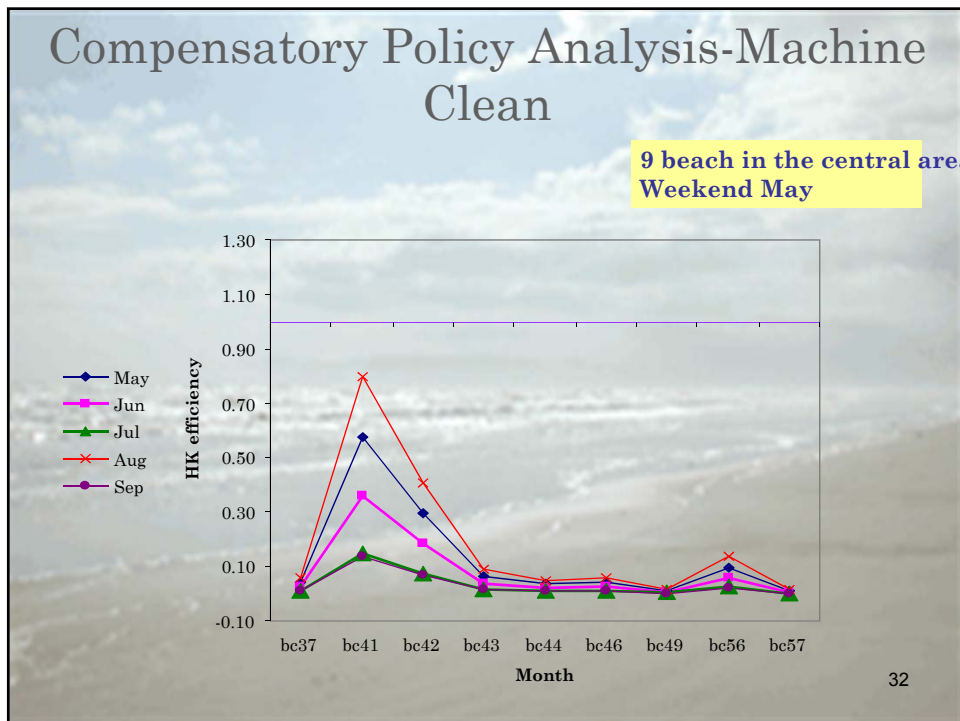








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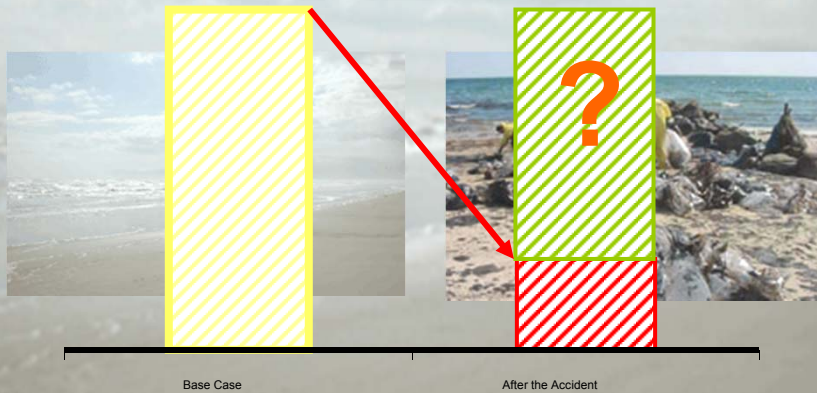


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How to measure the Welfare Loss?

$$\Delta \text{Welfare} = \text{Expected Utility BEFORE the event} \\ - \text{Expected Utility AFTER the event}$$

Expected Utility



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Random Utility Model

$$U_{ij} = \beta_{ij} X_{ij} + \varepsilon_{ij}$$

U_{ij} Utility of a beach j to an individual i

β_{ij} Vector of coefficients of beach j or individual i characteristics variables

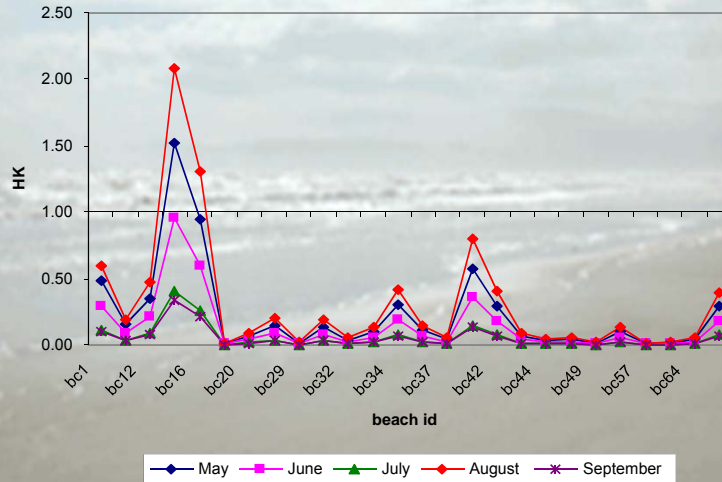
X_{ij} Vector of beach j and individual i characteristics

ε_{ij} Error components

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Compensatory Policy Analysis (cont.) -Machine Clean

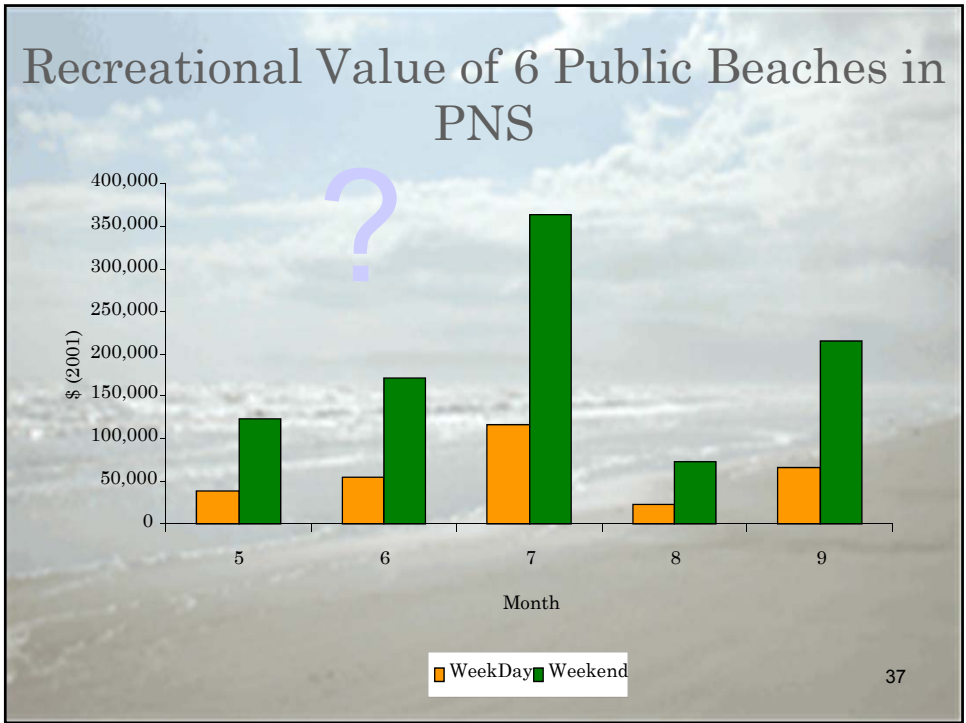
26 beach Weekend May



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Calibrated Recreational Value of 6 Public Beaches in PNS

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Possibly Over-stated sample

- Graph between sample and NPS

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Random Utility Model Nested Logit

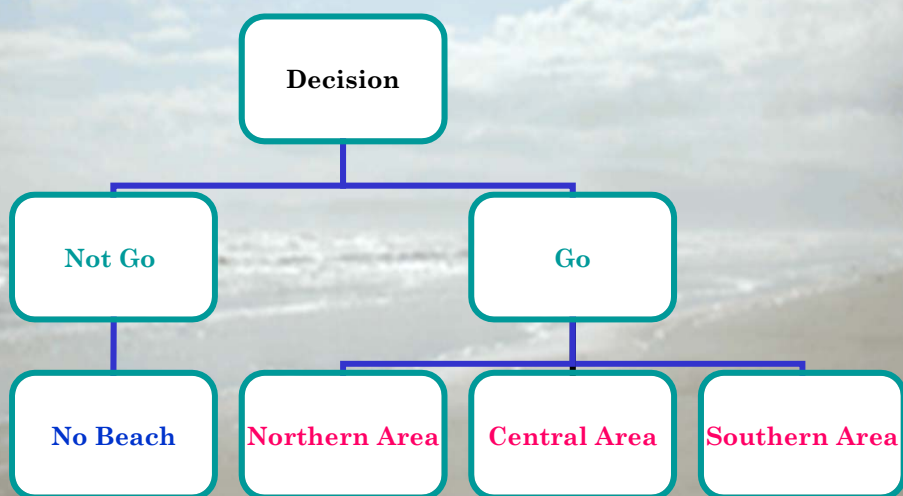
$$U_{ij} = \beta_j X_{ij} + \varepsilon_{ij}$$

$$\beta \sim (m, sd)$$

- Merits:
 1. Taste Heterogeneity among population
 - 2.
 - 3.

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Nested Logit Model



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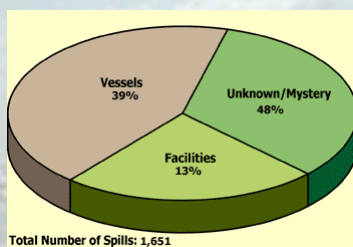
Oil Spill/Red Bloom and Beach Recreation




ine/recreation_restoration/welcome.html#

Beach closing in Texas

- http://www.texasep.org/html/wql/wql_5cst_gulf.html



By oil spill
By Red tide

- 
- Insert Texas Beach map:high lighted nesting structure

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Data

- Research focusing area:
6 public beaches in Padre Island National Shoreline Park///Galveston?
- Revealed preference data:
2001/5 waves/884 full participants and 565
after data cleaning/2704 trips
Discrete choice model
Using demographic and site characteristic
variable

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Mixed Logit Estimates

- Triangular...100 halton draws
- Insert a table

45

Candidates of Non-Monetary Compensatory Equivalents

From Model

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]
+-----+	+-----+	+-----+	+-----+	+-----+
RSTR	.45512310	.11287491	4.032	.0001
LFGRD	.26994272	.11698975	2.307	.0210
MCHCLN	.88386254	.10994835	8.039	.0000
MANCLN	.49402739	.12523103	3.945	.0001
NFS	-.14450127	.12062248	-1.198	.2309
NSWIM	-.57962945	.24182955	-2.397	.0165
VFR	.41896868	.12941636	3.237	.0012
VFRA	.48434288	.14494130	3.342	.0008

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Non-Monetary Public Service Applied Beaches in the Region5

Insert a map which highlighted the region5

```
Go[NBch(s1,s2,s3,s4,s5,s6,s7,s8,s9,s10,
s11,s12,s13,s14,s15,s16,s17,s18,s65,
s19,s20,s21,s22,s23,s24,s25,s26,
s27,s28,s29,s30,s31,s32,s33,s34,s35),
CBch(s50,s51,s52,s53,s54,s55,
s36,s37,s38,s39,s40,s41,s42,s43,s44,
s45,s46,s47,s48,s49,s56,s57),
SBch(s58,s59,s60,s61,s62,s63,s64)]
```

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Non-monetary compensatory policy

Scenario 1:

Expanding **Manual Cleaning** in the Region3 based on
distance proximity

insert a graph

48

Non-monetary compensatory policy

Scenario 1:

Expanding **Machine Cleaning Service** in the Region3
based on distance proximity

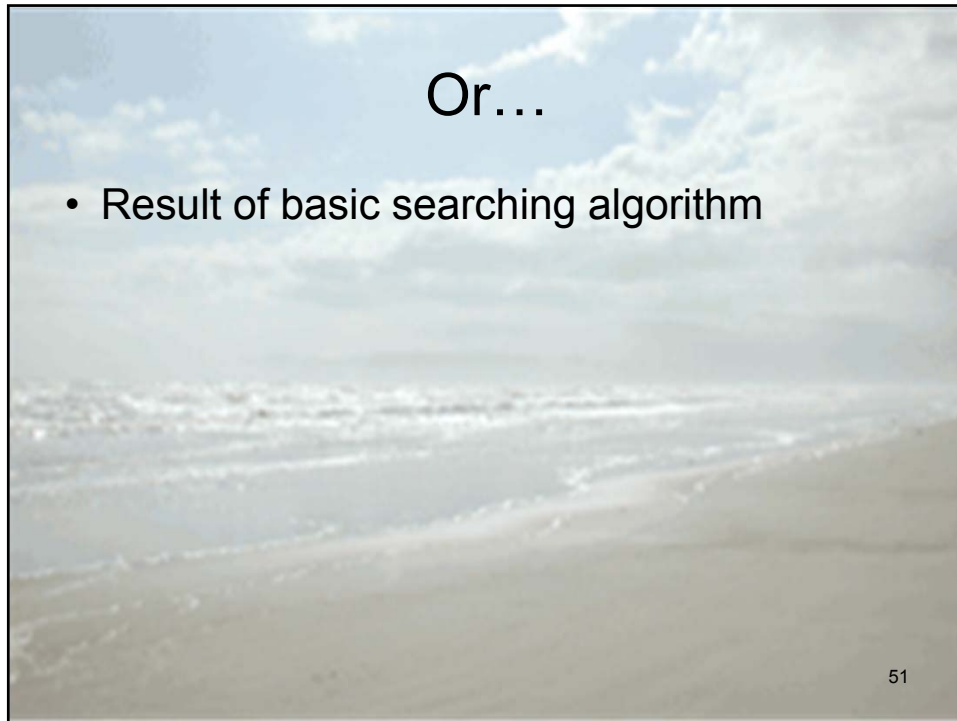
insert a graph

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Non-monetary compensatory policy

- Scenario 2:
- insert a graph

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Jsifdd



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