$FISH

An economic assessment of lower and central Cook Inlet sport fisheries

SOFTWARE MANUAL

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The authors are with: 1) North Pacific Fishery Management Council; 2) Department of Economics, University of Alaska Fairbanks; 3) Alaska Fisheries Science Center, National Marine Fisheries Service; and, 4) Department of Economics, Utah State University. Any views expressed are solely those of the authors, and should not be construed as representing those of the institutions by which they are employed. Correspondence should be addressed to Charles Hamel (chuck.hamel@noaa.gov) or Mark Herrmann (ffmlh@uaf.edu). 1. Introduction to $FISH

1. Introduction to $FISH

$FISH is an interactive Microsoft Excel based computer program developed to accompany *An Economic Assessment of the Sport Fisheries for Halibut, and Chinook and Coho Salmon in Lower and Central Cook Inlet* [Herrmann et al. 2001]. This program is designed to explore the economic effects of changes in the attributes of lower and central Cook Inlet sport fisheries for halibut or salmon that might arise from changes in abundance, or regulatory change. The program derives compensating variations (net benefits to sport fishers) and regional economic impacts to the western Kenai Peninsula associated with the perceived angler reaction to modeled changes.

System requirements

$FISH.xls is designed to run in Microsoft Excel for Office 97 or Office 2000 under the Windows 9x, Windows 2000, or Windows NT operating system. A Pentium class PC with at least 64 MB of RAM is recommended. The program is memory and processor intensive and will run best on PCs with a large amount of memory and a fast processor.

Installation

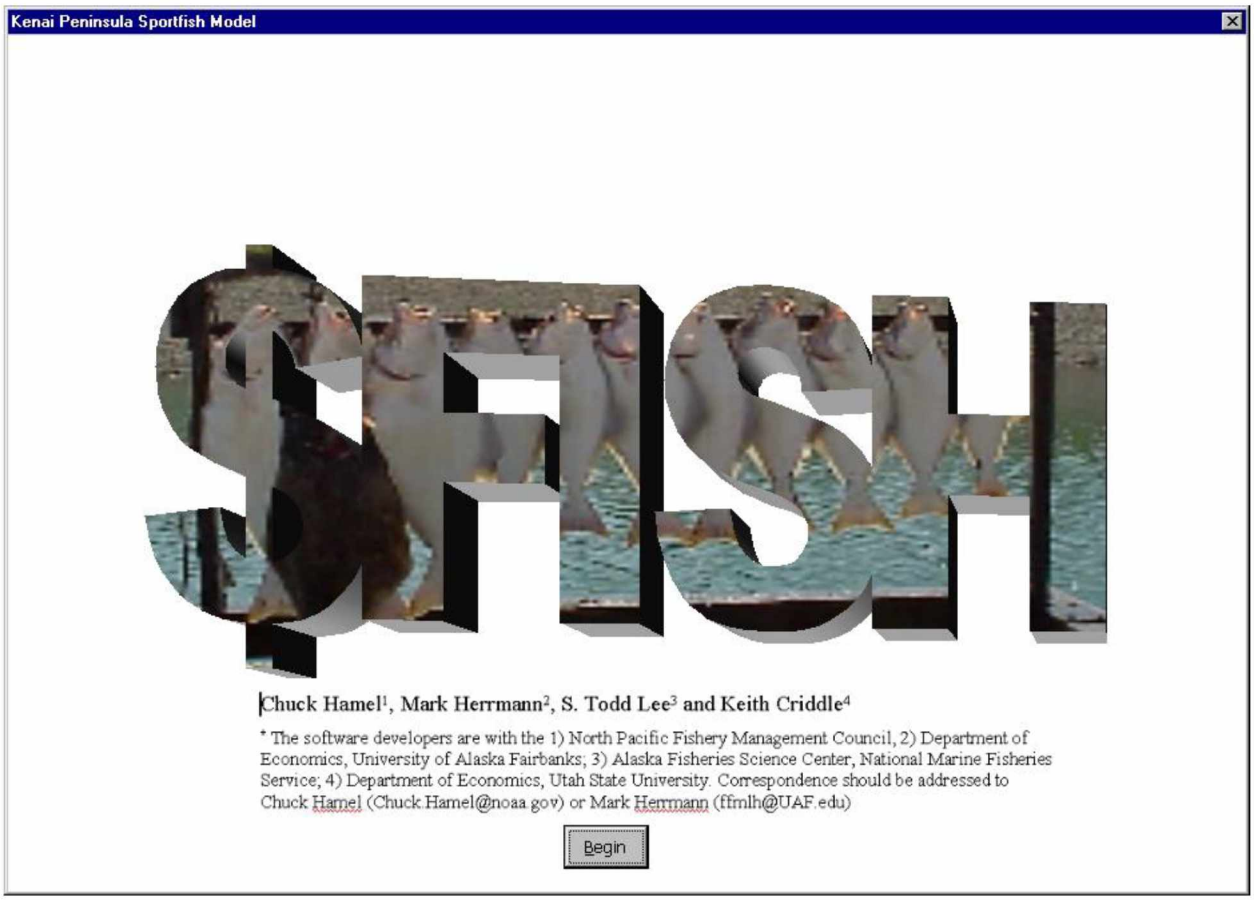
$FISH.xls is distributed as a compressed Microsoft Excel file. Upon extraction, save $FISH.xls to a preferred directory and launch with the standard file open sequence in Microsoft Excel. Depending on options selected during the installation of Microsoft Excel, it may be necessary to copy some drivers into system directories.

2. Operating $FISH

Initial View

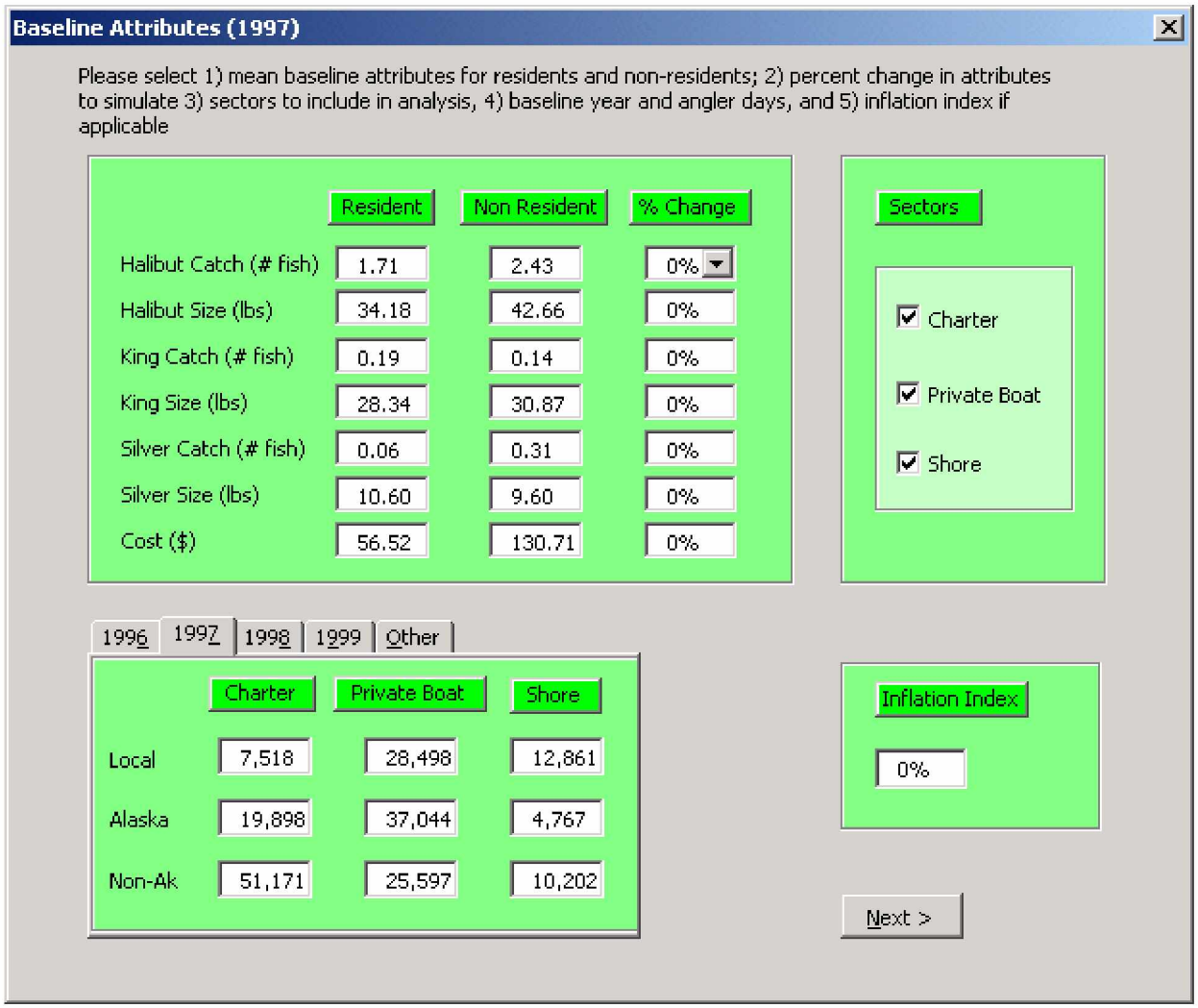
When $FISH.xls is opened, the user may be warned it contains macros. These macros are required for program operation. To run the program, select the [Enable Macros] button. $FISH.xls is set to open as a password-protected, read-only workbook. Please select the [Read only] button to continue to launch the application. Additionally, a message box may appear prompting the user to update any information linked to other workbooks. If this message appears, select [No].

An opening splash screen will be displayed:



After the Begin button has been selected a form will appear prompting the user to enter: 1) mean catch and weight attributes; 2) the percentage change to apply to the mean attributes; 3) sectors to include in the analysis (i.e. charter, private boat, and shore-based fishing); 4) baseline year and the number of angler days for the year modeled; and 5) an inflation factor to apply to the model's nominal dollar values.

IMPORTANT: The user can select effort values that correspond to the 1996 through 1999 time period, or supplant his or her own values under the "Other" option of the tab strip. However, the estimated angler days expenditures are based on 1997 data, which is the default year for this model. (See Table 1 of Herrmann et al. [2001] for a more detailed representation of Cook Inlet sportfishing effort.)



The Alaska Department of Fish and Game (ADF&G) reported effort levels for 1996–1999 can be selected by clicking on the appropriate years. Or, if "Other" is selected, the user can model for any effort desired by entering new values. Note however, that unless the mean 1997 level attributes are changed, the resulting monetary effects will be based on 1997 level average trip attributes even if the total figures are based on alternative year total effort.

Selecting the Next > button will update the trip attributes and display a worksheet titled *Baseline Data*. Changes in estimated participation are displayed by residency, and the expected participation change in terms of angler days fished for each sector and residency category are also shown. If the baseline data needs to be changed, the user form can be called back by selecting the Change Data button.

This and other worksheets within the model have been programmatically customized for viewing on a 17 inch monitor. If the user needs to make changes to these settings, they can be adjusted by calling the Zoom feature under the View heading of Excel's menu bar.

After entering new data values or accepting the default values, select the Next > button to move to the output worksheets. The Next > button is always located in the bottom right-hand corner of the display. To print the current worksheet the user can select the Print button. On the last page the reader can select Return to return to the *Baseline Data* sheet.

Additional Worksheets

Upon clicking the Next > button from the *Baseline Data* worksheet, the model will generate economic impacts and output them to a worksheet titled *Economic Impacts*. This sheet shows the regional economic impacts resulting from changes in angler spending for the 10 expenditure categories. (See Table 23 of Herrmann et al. [2001] for the corresponding baseline expenditures.) Impacts can be evaluated for sales (output), employment, income, and other value added classes.

A worksheet titled *Impacts by Final Demand Category* shows the same economic impacts distributed among 26 aggregated final demand categories. (See Herrmann et al. [2001] Appendix A.)

The fourth and last worksheet, titled *Compensating Variations*, reports changes to the consumer surplus measurement described in Section 4 of Herrmann et al. [2001]. The baseline compensating variations for the 1997 fishery can be found in Herrmann et al. [2001], Table 39.

Simulations

A variety of baseline simulations can be run using the default data for the lower and centralCook Inlet 1997 sport fishery. To perform a simulation click the Begin button from the initial view or the Change Data button on the *Baseline Data* worksheet to call up the *Baseline Attributes* (1997) user form. All simulation changes are to be made in this display. Whenever changes to the data are to be simulated, click the Next > button on the user form.

% Change

% Change is the most important user-modified input. Changes from the baseline mean expected catches are simulated by selecting the % Change drop down list for the relevant attribute and selecting from the range of percentage changes shown. Catch numbers and weight changes are available in 5% increments over the range −100% to +20%. % Change is bounded by an upper limit of +20% because it is driven by a functional form chosen for damage assessment and reductions in angler activity stemming from policy changes. The range for cost percentage changes is −50% to +50%.

Estimated 1997 Angler Days

The estimated effort used in the Herrmann [2001] study was based on Alaska Department of Fish and Game estimated effort for the Cook Inlet portion of the Kenai Peninsula for 1997. This effort is likely to change over the years and can be altered by entering new effort figures in the lower effort box titled Estimated 1997 Angler Days. (Before making changes to the fishing attributes please read the Appendix [note 1].)

Inflation

The baseline simulation defaults to a 1997-dollar base. To inflate these dollar figures to represent impacts in current dollar terms, enter a percentage value in the Inflation Index text box. For example, if the analyst believes that the dollar has inflated in value by 8.2% since 1997, s/he should enter 8.2% in the Inflation Index box.

Baseline Fishery Data

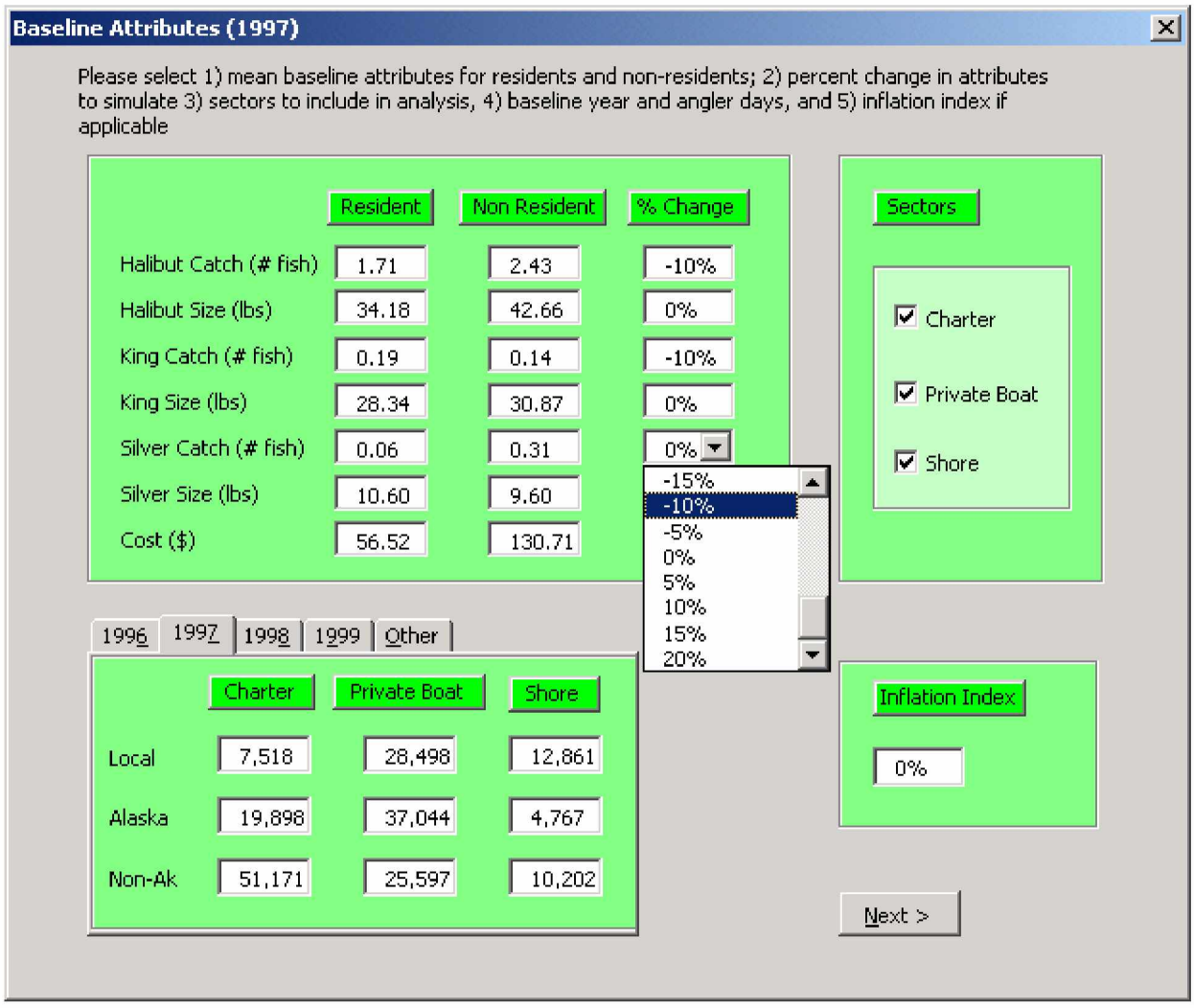
The baseline fishery data is displayed for the 1997 season aggregated across all fishing sectors. This information can be changed to reflect current fishery conditions, data permitting. To change this data click the relevant text box and enter new values. The Alaskan and nonresident values for fish catch, weight, and trip cost need to be changed individually. (Before making changes to the fishing attributes please read the Appendix [note 2].)

Sectors

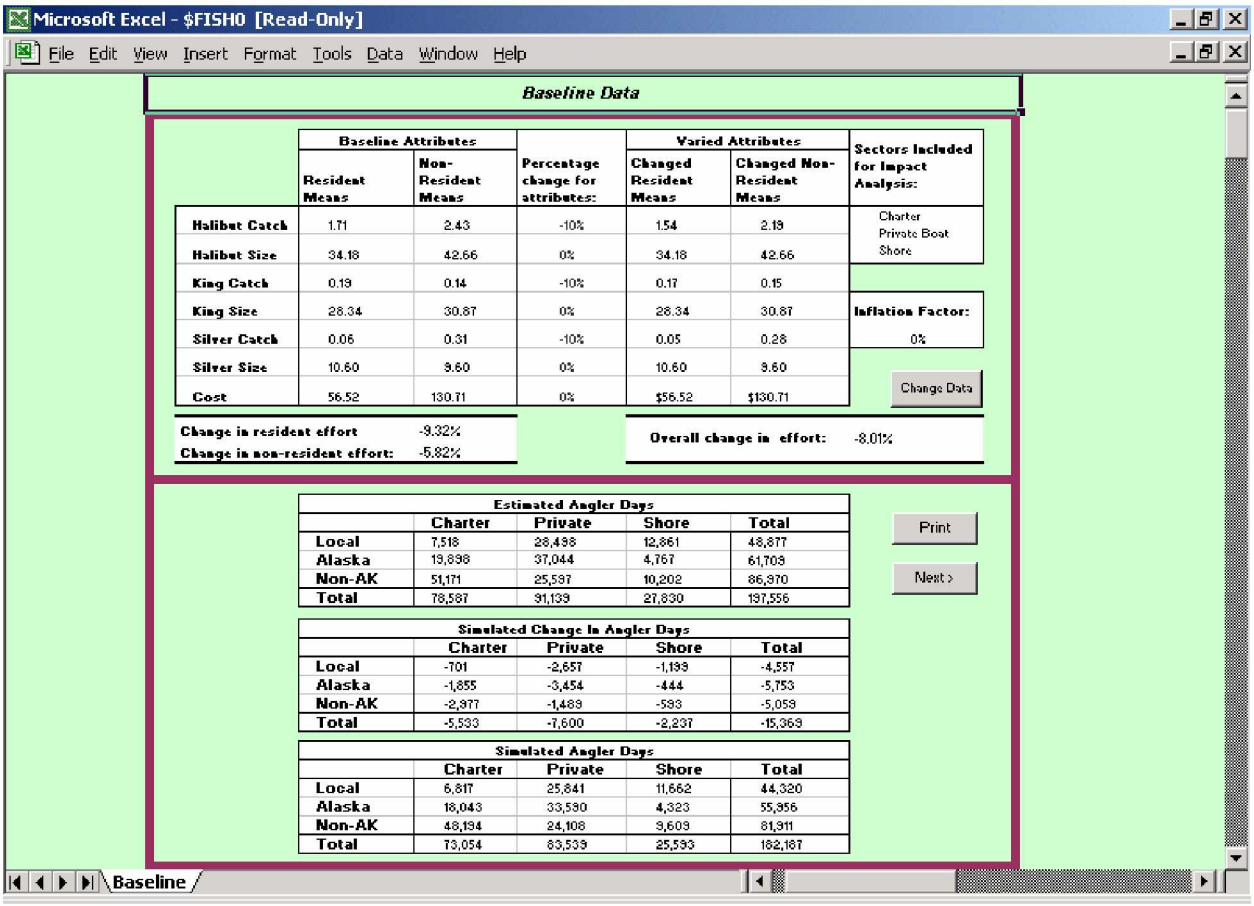
The initial baseline simulations are for data aggregated across all fishing sectors. If the analyst wishes to evaluate sector specific effects, such as changes to the charter fishery only, s/he can choose the appropriate checkbox. (Before making changes to the fishing attributes please the Appendix [note 2].)

3. An Example

The following example evaluates the economic effects of a simulated decline in expected catch of 10% for both halibut and salmon. This demonstration recreates the scenario and results of values reported in Herrmann et al. [2001]. From the *Baseline Data* window select the Change Data button to call up the *Baseline Attributes* (1997) user form. Select –10% from the drop down lists corresponding to the halibut catch and each of the salmon rows, and make sure that all three sectors are included for analysis (shoreline, private boat, and charter). The *Baseline Attributes* (1997) screen should look like:

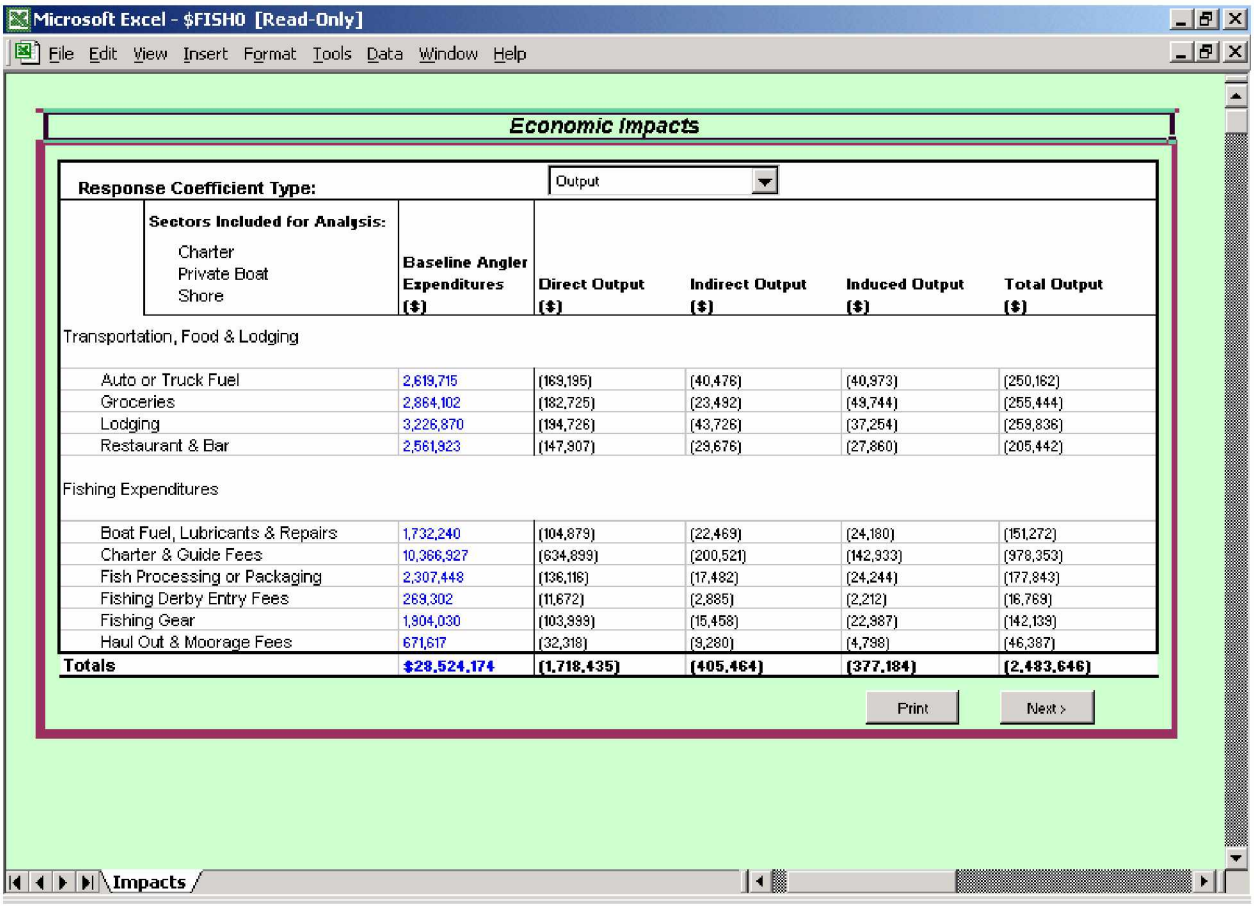


After clicking the Next > button, the resulting *Baseline Data* worksheet will look like:



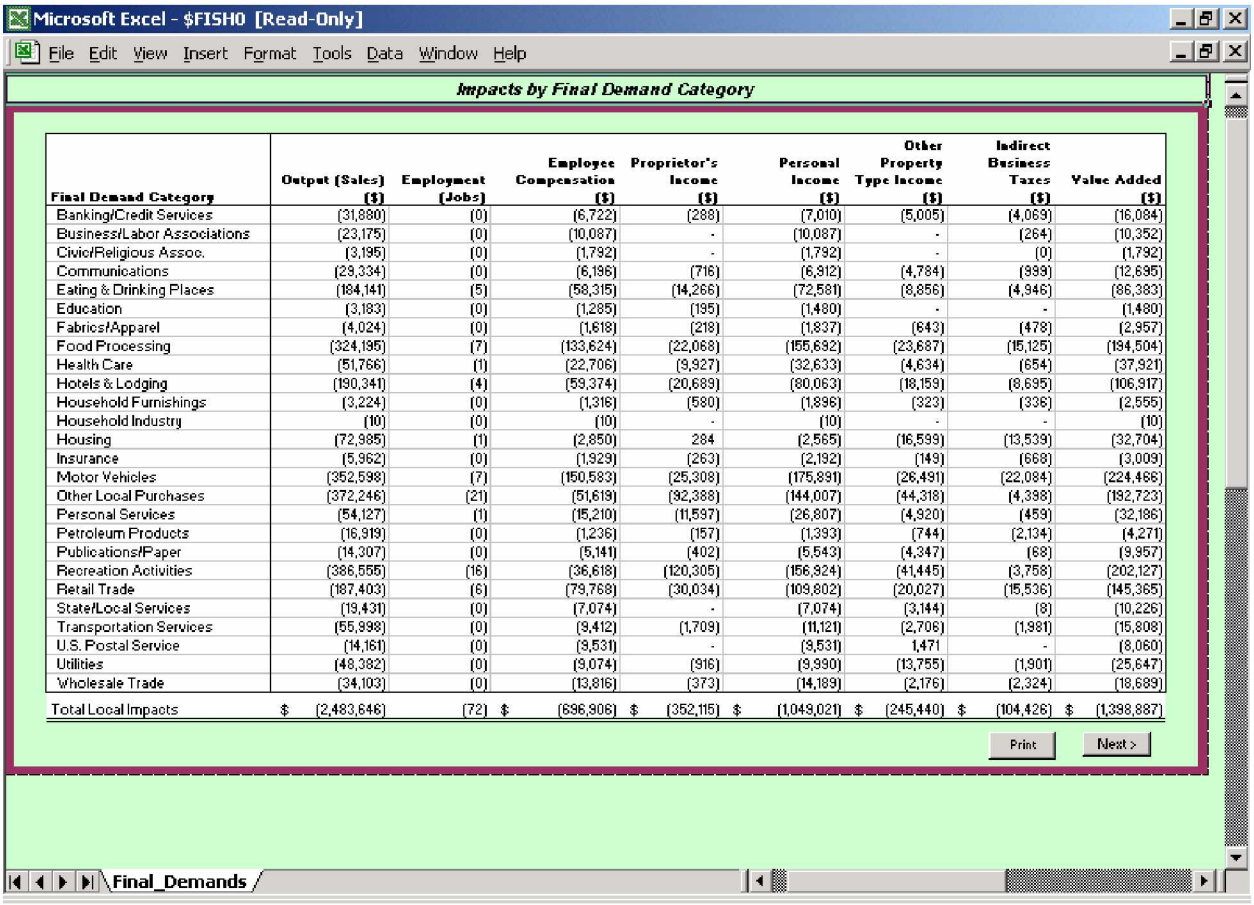
The model predicts that if the expected catch of halibut and salmon decreases by 10%, resident and nonresident fishing effort (in days) will decrease by 9.32 and 5.82 percent respectively. (See Table 32 in Herrmann et al. [2001].) The effort in angler days is shown below the percentage changes. For the 10% expected reduction in catch it is estimated that sportfishing days will diminish by 15,369 of the 1997 baseline (197,556), for a total of 182,187 days. Estimated changes are disaggregated to fishing sector and residency category.

Clicking the Next > button calls up the following view:



The economic impacts are discussed in greater detail in Herrmann et al. [2001]. The above table includes economic impacts on output from changes in spending for the 10 expenditure sectors queried in the UAF survey. The direct output reflects the amount of increased or decreased spending of new money for each angler expense category. For example, reading across the line labeled "Auto or Truck Fuel", we begin with a total of $2.62 million based on the amount of money spent by sport fishers in the shore, private boat, and charter fishery modes that were directly attributable to the saltwater fisheries in 1997. The effort reductions for residents (9.32%) and nonresidents (5.82%) translate into equivalent reductions in angler day expenditures for each group. This amounts to a decrease in sales of automotive fuels by $169,195, the entry under the "Direct Output" column. As fuel sales decline, fuel retail outlets decrease their local purchases of inputs from other sectors, causing these sectors to also decrease their inputs for a combined indirect effect of $40,476, and households with members employed by these sectors spend less on local goods and services for an induced effect of $40,973. Taken together, the total effect on regional sales (output) caused by the anticipated decreases in sport caught fish and subsequent decline in fuel spending is $250,162.

Selecting the Next > button brings up the *Impacts by Final Demand Category* worksheet, which shows the simulated impacts reported above in terms of 26 final demand categories by each of the impact classes (output, employment, personal income, etc.).



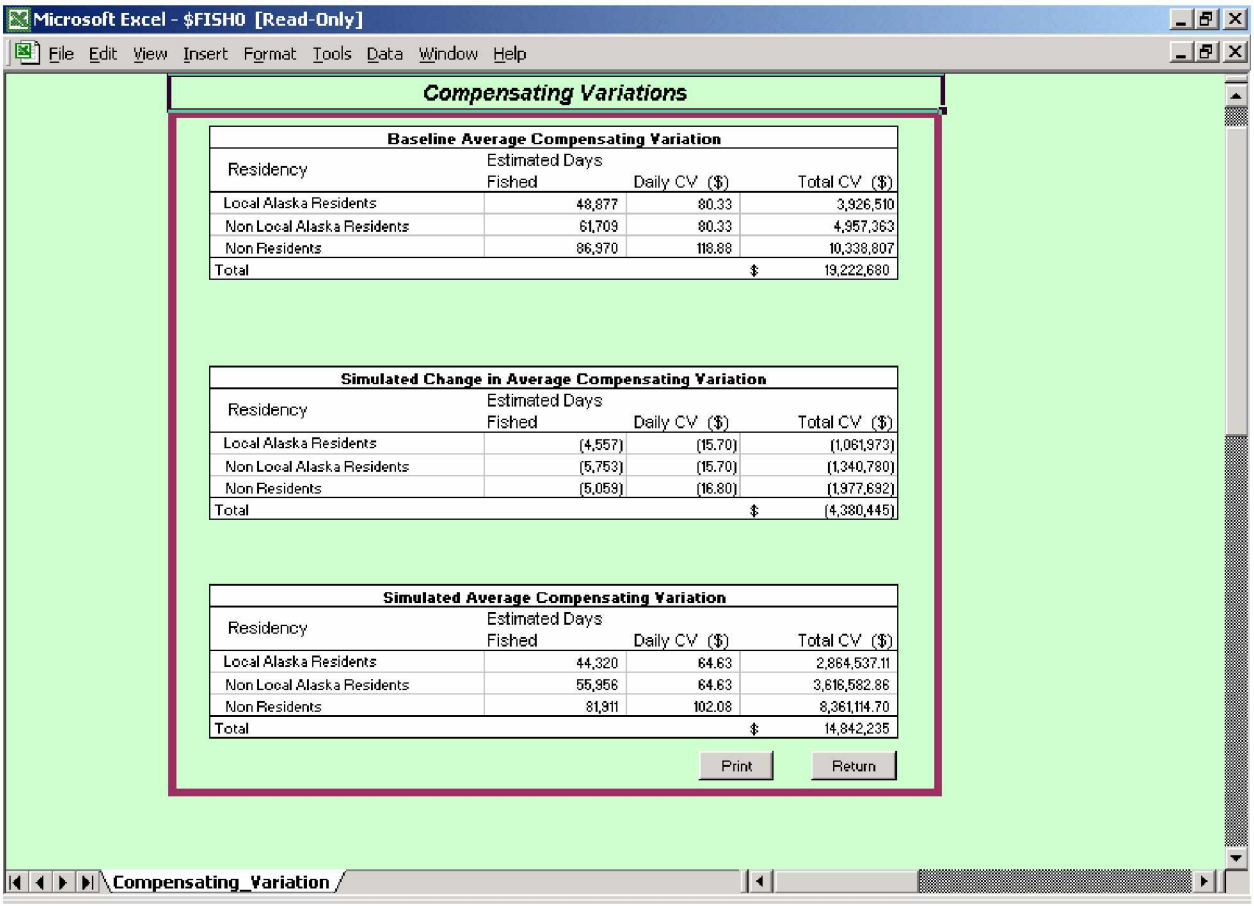
Impacts by Final Demand Category

Final Demand Category	Output (Sales) ($)	Employment (Jobs)	Employee Compensation ($)	Proprietor's Income ($)	Personal Income ($)	Other Property Type Income ($)	Indirect Business Taxes ($)	Value Added ($)
Banking/Credit Services	(31,880)	(0)	(6,722)	(288)	(7,010)	(5,005)	(4,069)	(16,084)
Business/Labor Associations	(23,175)	(0)	(10,087)	-	(10,087)	-	(264)	(10,352)
Civic/Religious Assoc.	(3,195)	(0)	(1,792)	-	(1,792)	-	(0)	(1,792)
Communications	(29,334)	(0)	(6,196)	(716)	(6,912)	(4,784)	(939)	(12,635)
Eating & Drinking Places	(184,141)	(5)	(58,315)	(14,266)	(72,581)	(8,856)	(4,946)	(86,383)
Education	(3,183)	(0)	(1,285)	(195)	(1,480)	-	-	(1,480)
Fabrics/Apparel	(4,024)	(0)	(1,618)	(218)	(1,837)	(643)	(478)	(2,957)
Food Processing	(324,195)	(7)	(133,624)	(22,068)	(155,692)	(23,687)	(15,125)	(194,504)
Health Care	(51,766)	(1)	(22,706)	(9,927)	(32,633)	(4,634)	(654)	(37,921)
Hotels & Lodging	(190,341)	(4)	(59,374)	(20,689)	(80,063)	(18,159)	(8,695)	(106,917)
Household Furnishings	(3,224)	(0)	(1,316)	(580)	(1,896)	(323)	(336)	(2,555)
Household Industry	(10)	(0)	(10)	-	(10)	-	-	(10)
Housing	(72,985)	(1)	(2,850)	284	(2,565)	(16,599)	(13,539)	(32,704)
Insurance	(5,962)	(0)	(1,929)	(263)	(2,192)	(149)	(668)	(3,009)
Motor Vehicles	(352,598)	(7)	(150,583)	(25,308)	(175,891)	(26,491)	(22,084)	(224,466)
Other Local Purchases	(372,246)	(21)	(51,619)	(92,388)	(144,007)	(44,318)	(4,398)	(192,723)
Personal Services	(54,127)	(1)	(15,210)	(11,597)	(26,807)	(4,920)	(459)	(32,186)
Petroleum Products	(16,919)	(0)	(1,236)	(157)	(1,393)	(744)	(2,134)	(4,271)
Publications/Paper	(14,307)	(0)	(5,141)	(402)	(5,543)	(4,347)	(68)	(9,957)
Recreation Activities	(386,555)	(16)	(36,618)	(120,305)	(156,924)	(41,445)	(3,758)	(202,127)
Retail Trade	(187,403)	(6)	(79,768)	(30,034)	(109,802)	(20,027)	(15,536)	(145,365)
State/Local Services	(19,431)	(0)	(7,074)	-	(7,074)	(3,144)	(8)	(10,226)
Transportation Services	(55,998)	(0)	(9,412)	(1,709)	(11,121)	(2,708)	(1,981)	(15,808)
U.S. Postal Service	(14,161)	(0)	(9,531)	-	(9,531)	1,471	-	(8,060)
Utilities	(48,382)	(0)	(9,074)	(916)	(9,990)	(13,755)	(1,901)	(25,647)
Wholesale Trade	(34,103)	(0)	(13,816)	(373)	(14,189)	(2,176)	(2,324)	(18,689)
Total Local Impacts	$ (2,483,646)	(72)	$ (696,906)	$ (352,115)	$ (1,049,021)	$ (245,440)	$ (104,426)	$ (1,398,887)

Note that the output change of –$2,483,646 matches the "Total Output" figure under the *Economic Impacts* view shown earlier. The decreased angler spending in the 10 expenditure categories and consequent effects are apportioned across a list of 26 industrial sectors.[1] For example, the decreased angler spending causes a decrease in sales of "Recreational Activities" of $386,555. Consequently, 16 jobs are lost and personal income within this sector declines by $156,924.

[1] These sector aggregations are developed in Jensen [1997].

Selecting the [Next >] button one last time calls up the *Compensating Variations* worksheet:



Compensating variation is analogous to consumer surplus and represents the net benefits to anglers of fishing. Simply stated, this reflects the difference between the costs anglers would have been willing to pay and what they actually incurred to fish. For a 10% decrease in expected catch of halibut and salmon the estimated compensating variation for the Cook Inlet saltwater sport fishers declines from $19.2 to $14.8 million. This total loss in consumer surplus is estimated to come from a loss of $1,061,973 from local fishermen, $1,340,780 from other Alaskans and $1,977,692 from nonresidents.

To model a new scenario, select the [Return] button to return to the *Baseline Data* worksheet.

4. Appendix

NOTE 1. Rather than altering the baseline fishery data, changes in expected catch should be simulated by modification of the [% Change]. The [% Change] category affects demand while changing the baseline fishery data does not. [% Change] is used to simulate hypothetical changes to the fishery. The baseline fishery data should reflect actual trip data.

NOTE 2. $FISH was designed based on a "generic" fishing trip using 1997 data. The participation-rate model was not based on a particular fishing mode; that is, when the respondents stated their preferences to whether or not they would have taken a presented trip they were not told that the trip was on board a charter or private vessel or a shoreline trip. To estimate the changes to these three trip modes for simulated changes in catch, weights, or trip price, the same percentage is applied across fishing modes. If a researcher wants to simulate just the charter industry, for instance, a check of just the charter industry will disaggregate these numbers using the "generic" trip attributes. An alternative way of modeling the charter industry is to use fishery characteristics more often found with a charter trip, and then changing the charter fishery attributes to reflect this. These two methods will give different results and need to be discussed within the context of the underlying assumptions.

5. Acknowledgements

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