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**A USER'S GUIDE TO TRIPSIM:
A PROGRAM WHICH SIMULATES NET
REVENUES FROM A FISHING TRIP**

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A USER'S GUIDE TO

TRIPSIM:

A PROGRAM WHICH SIMULATES NET
REVENUES FROM A FISHING TRIP*

by

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A USER'S GUIDE TO

TRIPSIM

I. INTRODUCTION

TRIPSIM is a program designed to simulate net revenues from a fishing trip. The user is asked twenty questions relating to the operating conditions for his vessel as well as his catch and price expectations. With this input the program will generate random catch and price levels and compute gross revenue, trip cost, net revenue, crew's share and ship's share. The program may be most useful for fishermen considering a change in fisheries. It allows for a systematic inquiry into the net revenue prospects of a trip before leaving port.

The program was written in BASIC on the TRS-80 (PC-2) pocket computer, providing a powerful yet portable way for fishermen, extension specialists or researchers to inquire into the net revenue consequences of a particular trip decision.* While designed for research into the costs and returns of trawlers fishing in coastal waters of the Northeastern U.S., the program may be used for more "passive" gear technologies as well.

The next section goes into a detailed discussion of the trip characteristics used as program inputs. Values for a scallop trip to Georges Bank by a vessel from Greenport, New York, are discussed to provide the reader with a concrete example.

*The TRS-80 (PC-2) is sold by Radio Shack and currently (October 1982) retails for about \$280.00. An identical computer is marketed by Sharp (model #PC-1500).

Section III describes the program's output and the opportunity to rerun the same or different trips (with new cost, catch, or price expectations). The inputs and outputs for the scallop trip are discussed in Section IV and recorded on a "log" which may provide a useful format to record the results of your runs aboard TRIPSIM. Finally, the program itself is appended for the benefit of prospective users.

II. PROGRAM INPUTS

When loaded into the computer, TRIPSIM may be accessed by (i) turning the computer on, (ii) setting the computer in the "run" mode (by pressing the "mode" button until the word run appears at the top of the display), (iii) typing RUN, and (iv) pressing the ENTER bar. After five beeps the computer will display the sentence:

HELLO! THIS IS TRIPSIM.

after which the computer will stop to display the first input question. There are twenty input questions in total; most are obvious in their request, but let's take each in turn, explore some possible responses, and enter values for our scallop trip.

1. VESSEL NAME?: Simply asks for the name of the vessel about to embark on our hypothetical trip. You may enter any name up to twelve letters in length by typing the appropriate letters on the keyboard. Names longer than twelve letters are truncated. When the vessel's name has been correctly typed, press the ENTER bar. If you make a typing error, press "CL" and start over. The name of our scallop vessel is the SEASTAR. After typing her name and pressing the ENTER bar the second question will be displayed.

2. HOME PORT?: Simply asks for the vessel's home port. The letter limit applies here as well. Type the name of the vessel's home port and

press the ENTER bar. SEASTAR's home port is Greenport.

3. SPECIES SOUGHT?: Asks for the principal species sought, for example, flounder, scallops, or squid. In a mixed-species fishery, such as the New England groundfishery, you may wish to enter MIXED or some abbreviation of the species types, for example, COD/HAD/FLD. Again, only twelve letters are retained in the computer's memory. After typing the species sought, press the ENTER bar. SEASTAR is going for SCALLOPS.

4. HOURS STEAMING?: Asks for the total number of hours spent steaming to and from the fishing ground (or grounds). Roundtrip steaming for SEASTAR takes 45 hours.

5. FUEL (G/HR) STEAMING?: Asks for the fuel consumption (gallons per hour) while steaming. For the SEASTAR this is 25 G/HR.

6. HOURS FISHING?: Asks for the total number of hours spent fishing, for example, the number of hours spent towing a net. The SEASTAR will be fishing for ten days or 240 hours.

7. FUEL (G/HR) FISHING?: Asks for the fuel consumption per hour while fishing. For trawlers the fuel consumption while fishing (towing the net) might be higher than while steaming. For fixed gear fishermen, the fuel consumption while fishing might be negligible (i.e., zero). This variable allows the fisherman to differentiate between fuel consumption rates while steaming (in transit) and fuel consumption while fishing. SEASTAR consumes fuel at a rate of 25 G/HR while dredging.

8. FUEL COST (\$/GAL)?: Asks you to enter your current cost for a gallon of fuel. Diesel costs SEASTAR 1.18 dollars per gallon.

9. OIL COST (\$)?: Asks you to enter the cost for oil consumed during the trip. Lubricating oil for the SEASTAR for this trip runs 140 dollars.

10. ICE COST (\$)?: Asks you to enter the cost of ice used in storing or boxing catch while at sea. This amounts to 1,200 dollars for the SEASTAR. (Do not use commas when entering values.)

11. BAIT COST (\$)?: Asks for the cost of any bait used during the trip. Trawlers will typically incur no bait costs. Lobstermen, crabbers, trap fishermen, or longliners may have significant bait costs. If there are no bait costs, type the number 0, and press ENTER. Bait costs for scalloping are zero.

12. FOOD COSTS (\$)?: Asks for the cost of food for captain and crew for the duration of the trip. Food costs aboard the SEASTAR are 1,500 dollars.

13. OTHER COSTS (\$)?: Permits the fisherman to estimate and enter other costs not reflected in questions four through twelve. These might include dockage or moorage fees or any cost item that is trip-related but not catch-related. Catch-related costs are most easily handled by adjustments to exvessel (dockside) price. Dredge and gear repair, related to the trip, cost the SEASTAR 1,000 dollars.

14. CREW SHARE RATE (%)?: Asks for the percentage share of net revenues going to the crew. If the crew share rate were 50%, the fisherman would type 50 and press the ENTER bar. The crew aboard the SEASTAR receives 65 percent of the net revenues.

15. LOWEST CATCH (LBS)?: Asks for the lowest possible catch for the trip. If there is a significant chance of catching no fish, type the number 0 and press ENTER. The SEASTAR has always landed more than 8,000 pounds of scallops.

16. HIGHEST CATCH (LBS)?: Asks for the highest possible catch for the trip. For the SEASTAR the highest possible catch is 16,000 pounds of scallops.

17. MOST LIKELY (LBS)? : Asks for the most likely catch for the trip. This number should fall between the lowest and highest possible catch. For the SEASTAR enter 10,000 pounds.

18. LOWEST PRICE (\$/LB)? : Asks for the lowest possible exvessel price (dollars per pound) for fish or shellfish caught on this trip. For a mixed-species trip the fisherman would have to enter a weighted average where the per pound price for each harvestable species is weighted by its share in total catch. For the SEASTAR the lowest price for scallops is 3.00 dollars per pound.

19. HIGHEST PRICE (\$/LB)? : Asks for the highest possible exvessel price (dollars per pound). For a mixed-species trip, you would need to enter a price equal to the weighted average of the highest possible prices for the relevant species. For the SEASTAR this highest possible price is 4.00 dollars.

20. MOST LIKELY (\$/LB)? : Asks for the most likely exvessel price (dollars per pound). Again, a mixed-species trip would require a weighted average of the most likely prices. For the SEASTAR enter 3.50 dollars.

For low, high and most likely prices you may wish to deduct any per pound packing and shipping charges that reduce the effective exvessel price. For example, if twenty-five pounds of fish are packed per box with a charge for packing and shipping of \$1.00 per box, you could compute the net exvessel price by deducting $\$1.00/25 = \0.04 from each of the three price estimates or weighted averages.

III. PROGRAM OUTPUTS

After entering the most likely price (\$/lb), you will hear five beeps and the computer will display the name of the vessel entered in

response to input question one. By sequentially pressing the ENTER bar, you will obtain nine more "outputs." Let's discuss each briefly.

1. VESSEL NAME = : Prints the name of the vessel entered in response to input question one.
2. HOME PORT = : Prints the name of the home port entered in response to input question two.
3. SPECIES SOUGHT = : Prints the name of the species sought entered in response to input question three.
4. CATCH (LBS) = : Prints a catch level generated by a triangular probability distribution (or density function). Thus the catch level is a random variable and will be different even if the same catch expectations (inputs 15, 16, and 17) are entered repeatedly.**
5. PRICE (\$/LB) = : Prints a price level generated by a triangular price density function in a manner identical to that used to generate the catch level; only the low, high and most likely values employed in this transformation are the price expectations specified in the responses to input questions 18, 19, and 20.
6. GROSS REVENUES (\$) = : Prints the product of price (\$/lb) times catch (lbs).
7. TRIP COST (\$) = : Prints the sum of fuel and trip related costs.
8. NET REVENUES (\$) = : Prints the value obtained when trip costs are subtracted from gross revenues. Net revenues may be positive

**Within TRIPSIM is a subroutine which generates a uniform (0,1) random deviate and successively transforms it to a symmetric triangular deviate and then to a non-symmetric triangular deviate. This transformation is described in the International Mathematical and Statistical Library (IMSL), Chapter G, pp. GGTRA-1 and 2.

(indicating the trip generated income above variable costs) or negative (indicating the trip failed to cover variable costs and incurred a loss).

9. CREWS SHARE (\$) = : Prints the share of net revenues going to the crew based on the crew share rate entered in response to input question 14. Crew members do not normally "share" negative net revenues, and the boat owner will usually absorb any loss in its entirety.

10. SHIPS SHARE (\$) = : Prints the share of net revenues going to the boat owner and skipper.

You may wish to record the inputs and outputs for each voyage aboard TRIPSIM. The appended log should prove useful for that purpose. Pressing the ENTER bar after the computer has displayed SHIPS SHARE will produce the input question:

ANOTHER TRIP? YES = 1, NO = 0.

If you type the number 1 and press the ENTER bar, the computer will transport you back to input question three, SPECIES SOUGHT?. You may now proceed to change a trip's cost characteristics or its catch and price expectations. If you do not wish to change a particular cost characteristic, you can simply press the ENTER bar and move to the next question. If the computer has not been turned off, it will still retain the cost components for the previous trip. You will need to reenter both catch and price expectations (low, high, most likely) as the program erases the catch expectations when price expectations are entered. By recording the inputs and outputs of previous trips you can explore the sensitivity of net revenues to changes in the various cost characteristics and catch/price expectations. You can take the same trip any number of times by leaving the cost components unchanged and reentering the same catch and price expectations (low, high and most likely values). If you do, trip

costs will remain unchanged, but catch, price, gross revenue and net revenue will vary because catch and price are being regenerated (albeit from the same distributions) for each trip.

If you are not interested in an additional trip, enter the number 0 and the computer will display, "PLEASE TURN ME OFF."

If you get "hung-up" at any point in the input process, you can simply turn the machine off, turn it back on, type RUN, press the ENTER bar and start all over again.

IV. RESULTS OF THE SEASTAR'S SCALLOP TRIP

The inputs for the SEASTAR's scallop trip are shown under the TRIP #1 column on the LOG FOR TRIPSIM on the following page. After the most likely price was entered, the computer gave a five beep signal to indicate the first of the nine outputs to be displayed. Outputs 1, 2, and 3 indicate the trip was taken by the SEASTAR, out of GREENPORT, going for SCALLOPS. The fourth output was CATCH, and on this trip the SEASTAR landed 14,024 pounds of scallops. Pressing the ENTER bar gave the fifth output, the randomly generated PRICE of 3.06 dollars per pound, which when multiplied by catch produced a GROSS REVENUE of 42,985 dollars (output six). TRIP COST totalled 12,247 dollars (output seven) which when deducted from gross revenues left NET REVENUES of 30,738 dollars (output eight). CREWS SHARE (output nine) was 19,979 dollars based on 65 percent of net revenues, leaving a SHIPS SHARE of 10,758 dollars.

Before you inquire into the cost of a scalloper, two things should be emphasized. First, this was the result of only one trip, and a relatively good one at that. The same cost, catch, and price expectations were entered thirty-one other times producing an average net revenue (\bar{X})

LOG FOR TRIP SIM

DATE 9/1/82

<u>INPUT:</u>	TRIP #1	TRIP #2	TRIP #3
1. VESSEL NAME?	<u>SEASTAR</u>	<u> </u>	<u> </u>
2. HOME PORT?	<u>GREENPORT</u>	<u> </u>	<u> </u>
3. SPECIES SOUGHT?	<u>SCALLOPS</u>	<u> </u>	<u> </u>
4. HOURS STEAMING?	<u>45</u>	<u> </u>	<u> </u>
5. FUEL (G/HR) STEAMING?	<u>25</u>	<u> </u>	<u> </u>
6. HOURS FISHING?	<u>240</u>	<u> </u>	<u> </u>
7. FUEL (G/HR) FISHING?	<u>25</u>	<u> </u>	<u> </u>
8. FUEL COST (\$/GAL)?	<u>1.18</u>	<u> </u>	<u> </u>
9. OIL COST (\$)?	<u>140</u>	<u> </u>	<u> </u>
10. ICE COST (\$)?	<u>1200</u>	<u> </u>	<u> </u>
11. BAIT COST (\$)?	<u>0</u>	<u> </u>	<u> </u>
12. FOOD COST (\$)?	<u>1500</u>	<u> </u>	<u> </u>
13. OTHER COSTS (\$)?	<u>1000</u>	<u> </u>	<u> </u>
14. CREW SHARE RATE (%)?	<u>65</u>	<u> </u>	<u> </u>
15. LOWEST CATCH (LBS)?	<u>8000</u>	<u> </u>	<u> </u>
16. HIGHEST CATCH (LBS)?	<u>16000</u>	<u> </u>	<u> </u>
17. MOST LIKELY (LBS)?	<u>10000</u>	<u> </u>	<u> </u>
18. LOWEST PRICE (\$/LB)?	<u>3.00</u>	<u> </u>	<u> </u>
19. HIGHEST PRICE (\$/LB)?	<u>4.00</u>	<u> </u>	<u> </u>
20. MOST LIKELY (\$/LB)?	<u>3.50</u>	<u> </u>	<u> </u>

OUTPUT:

1. VESSEL NAME =	<u>SEASTAR</u>	<u> </u>	<u> </u>
2. HOME PORT =	<u>GREENPORT</u>	<u> </u>	<u> </u>
3. SPECIES SOUGHT =	<u>SCALLOPS</u>	<u> </u>	<u> </u>
4. CATCH (LBS) =	<u>14,024</u>	<u> </u>	<u> </u>
5. PRICE (\$/LB) =	<u>3.06</u>	<u> </u>	<u> </u>
6. GROSS REVENUES (\$) =	<u>42,985</u>	<u> </u>	<u> </u>
7. TRIP COST (\$) =	<u>12,247</u>	<u> </u>	<u> </u>
8. NET REVENUES (\$) =	<u>30,738</u>	<u> </u>	<u> </u>
9. CREWS SHARE (\$) =	<u>19,979</u>	<u> </u>	<u> </u>
10. SHIPS SHARE (\$) =	<u>10,758</u>	<u> </u>	<u> </u>

```
500: IF X(24)=1 GOTO 80
510: PRINT "PLEASE TURN ME OFF."
520: END
600: RANDOM
610: X(15)=RND(0)
620: IF X(15)<=0.5 GOTO 690
630: X(16)=1-SQR(0.5*(1-X(15)))
640: IF X(16)<=0.5 GOTO 670
650: X(17)=2*X(14)-X(13)+2*(X(13)-X(14))*X(16)
660: GOTO 680
670: X(17)=X(12)+2*(X(14)-X(12))*X(16)
680: RETURN
690: X(16)=SQR(0.5*X(15))
700: IF X(16)<=0.5 GOTO 670
710: GOTO 650
```