ANALYSIS OF COASTAL AND OFFSHORE FISHERMEN'S WILLINGNESS TO ACCEPT THE REWARD OF REDUCING FISHING ACTIVITIES IN TAIWAN

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ABSTRACT

The government in Taiwan has recently instituted a comprehensive program to give fishermen the incentive to reduce fishing effort voluntarily. In this study, we conducted a survey to investigate fishermen's behavior and used the ANOVA analysis and the Probit model to identify factors that affect fishermen's willingness to accept the reward for reducing fishing activities. Out of the 279 valid samples, only 161 (57.71%) respondents are willing to accept the offer, which is much lower than the more than 80% that government expected. However, 98.57% of the respondents realized the deterioration of the coastal and offshore fishery resources and 78% supported restrictions on fishing activities during the spawning and juvenile seasons, an indication that a need for a mandatory season closure policy in the future.

This study finds that the accuracy of prediction of the Probit model is 87.81%, indicating that the model predicts fisherman's choice reasonably well. The primary variables that affect fishermen's willingness to accept the Reward of Reducing Fishing Activities Program are the average number of fishing days per trip, the type of policy in the coastal and offshore fishery deemed most urgent, whether the rewarding schedule being reasonable or not, the willingness to support rewarding schedule, and the willingness to support the government in implementing a restriction on fishing activities during the spawning and juvenile seasons.

The Probit regression results show that fishermen with fishing vessels that are between 50 and 100 tons are more likely to accept the offer than other fishermen. This may be attributed to the reduction of support on fuel, since larger size fishing vessels have higher fuel costs. Fishing vessel operators whose major fishing gears are torch light or others miscellaneous fishery gears and operate on a seasonal basis are more likely to accept the offer than fishing vessels in trawl and angling fisheries. Fishing vessels fishing within 12 nautical miles from the shore and whose owners are older than sixty-one years old are more likely to accept the offer. On the other hand, fishermen who disagree or very much disagree with the rewarding scheme and the view that fishing effort should be reduced when the support on fuel decreases, and who are unwilling to accept the offer under the reward level set for 2004, showed a lower percentage to accept the offer.

Keywords: Coastal and Offshore Fisheries in Taiwan; Willingness to Accept; Reward of Reducing of Fishing Activities Program; Probit Model

INTRODUCTION

In 2002, the total marine fish landing in Taiwan reached 1,059,142 metric tons with a total value NT$63 billion. The distant water vessels generated 72.7% of the total landing value, while the offshore and coastal fisheries only account for 19.9% and 7.3%, respectively, of the total landing value (Fisheries Agency, 1953-2002). The number of total fishing vessels in 2002 is 26,994, of which only 972 are greater than 200 gross tons (GT) and are all devoted to the distant water fishery.

More than 80% of the fishing vessels are less than 20 GT. For example, there are 13,273 fishing rafts which are built with plastic pipelines and equipped with gill net, set-net, beach seine fishing, fish fries catching and other hook gears are the major fishing gears in the coastal region. With a great number of fishing vessels competing for the same resources in the same area, overfishing was observed in the coastal fisheries in Taiwan.

If the fishing raft and sampans (small boat without fixed engine) are excluded, there are only 9,453 vessels left. The number of these fishing vessels by type of fisheries and vessel tonnages are shown in Figures 1 and 2. It is clear that the (tuna) long line, trawl, and torch light net are the three major fishing gears, and most of the vessels are all less than 50 gross tons.

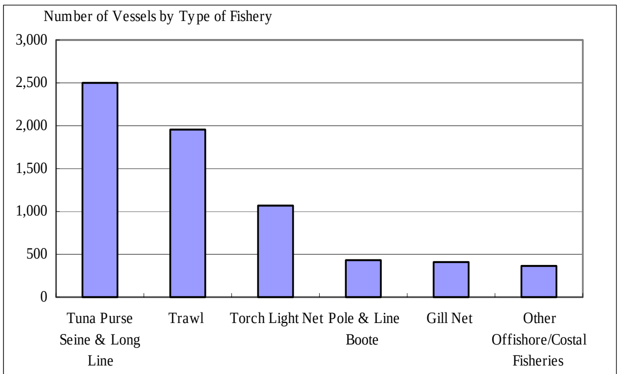

Figure 1. Fishing Vessels by Fishing Gear in Taiwan (2002)

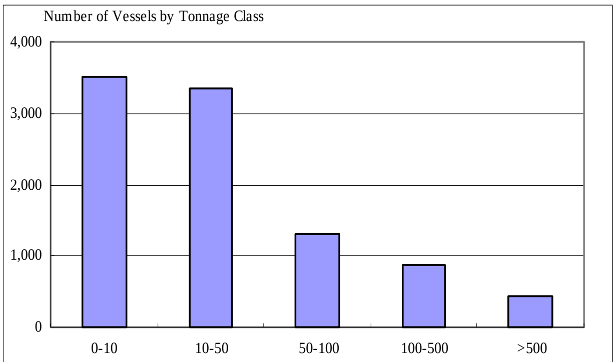

Figure 2. Fishing Vessels by Tonnage Class in Taiwan (2002)

Since 1978, the offshore harvests follow a downward trend, but the number of fishing vessels, the total vessel tonnage, and the total horsepower of vessels follow a steadily increasing trend. Overcapitalization has become obvious. In order to reduce the fishing effort of coastal and offshore fisheries in Taiwan, the government adopted two voluntary vessel buy back programs in 1991-1995 and 2000-2004, respectively. In addition, the authority had offered a voluntary rewarding program for fishing vessels which were found to have at least a cumulative 100 fishing days during the period from Sep. 1, 2002 to Aug.1, 2003 and had suspended their fishing activities voluntarily for at least 120 days cumulatively or 60 days in a row. The reward scheme is shown in Table 1.

The program has been running since September 2002 with an annual budget of approximately US$12 million. All fishing vessels in marine fisheries in Taiwan with valid fishing licenses are eligible, with the exception of illegal and recreational vessels and vessels over 30 years old.

Due to the crisis of overexploitation of global fishery resources, the UN issued an urgent demand requesting concerned states to do their best to reduce fishing efforts. The Reward for Reduction of Fishery Activities Program is aimed to encourage fishermen to reduce their fishing activities and thereby lowering the pressure on the fishery resources for the purpose of sustainable use. There has been several literatures evaluating the effect of season closure in fishing. For example, Somer and Wang (1997) investigated the multispecies northern prawn fishery in the north-western Austria; Gracia (1997) simulated the effects on the brown shrimp, Roel, Cochrane and Butterworth (1998) studied the jig fishery for chokka squidin in south Africa; Katoh, Kakuma and Kawasaki (2001) researched on the closure in Mexico Diamondback squid fisheries of Ryukyu Islands in Japan.

Table 1 Voluntary Reward Program for Fishing Vessels with 100 Fishing Days a Year Willing to Suspend Fishing Activities in Taiwan Unit: NT$/Year

Program / Vessel Type	2002/09/01 to 2003/08/31) For reducing fishing effort voluntarily (120 days cumulatively)	2003/09/01 to 2004/08/31		
		For reducing fishing effort voluntarily (120 days cumulatively)(A)	For closing fishery season mandatorily (60 days in a row)(B)	Ratio (C) = (B-A)/A
Sampan	8,000	8,000	20,000	1.50
Raft (shorter than 20 m)	10,000	10,000	30,000	2.00
Raft (longer than 20 m)	13,000	13,000	40,000	2.08
Less than 5 GT	13,000	13,000	40,000	2.08
5 GT to 10 GT	15,000	15,000	63,000	3.20
10 GT to 20 GT	18,000	18,000	73,000	3.06
20 GT to 30 GT	20,000	20,000	85,000	3.25
30 GT to 40 GT	23,000	23,000	97,000	3.22
40 GT to 50 GT	25,000	25,000	109,000	3.36
50 GT to 60 GT	28,000	28,000	121,000	3.32
60 GT to 70 GT	30,000	30,000	133,000	3.43
70 GT to 80 GT	33,000	33,000	145,000	3.39
80 GT to 90 GT	35,000	35,000	157,000	3.49
90 GT to 100 GT	38,000	38,000	169,000	3.45
Greater than 100 GT	38,000 +(GT-100)*300 (No more than NT$100,000)	38,000 +(GT-100)*300 (No more than NT$100,000)	169,000 +(GT-100)*1000 (No more than NT$900,000)	-
200 GT	68,000	68,000	269,000	2.96
500 GT	100,000	100,000	569,000	4.69
700 GT	100,000	100,000	769,000	6.69
1,000 GT	100,000	100,000	900,000	8.00

Source: Fisheries Agency, Council of Agriculture, Executive Yuan, R.O.C.

A mandatory suspension of fishing activities in the coastal zone of Zhejiang province has been instituted without compensation to fishermen by the authority in Mainland China since 1979. Since 1995, a stricter regulation was in force along the coast of the Mainland China and a three months suspension of fishing activities was also applied to the Estuary area of Changjiang River starting in Feb. 2003. On the other hand, it is worth noting that in Canada the employment insurance (EI) for fishermen has been in place since the 1957, which may be regarded as to give the fishermen an incentive to accept a short-term suspension of fishing activities. A more detailed discussion of the payment scheme was also provided in the Appendix for the purpose of the comparison with the payment scheme of the reward for reducing the fishing activities in Taiwan.

Will fishermen be willing to accept the offer and reduce their fishing activity voluntarily? Will the payment scheme provides enough incentive? In this study, we address these questions by conducting a survey to investigate fishermen's behavior and using ANOVA analysis and a Probit model to identify factors that affect fishermen's willingness to accept the reward of reducing fishing activities.

ANOVA OF THE SURVEY RESULT

The survey was conducted during November 2002 to April 2003 in the thirteen major coastal and offshore fishing counties, including Kaohsiung City, Kaohsiung County, Keelung, Taipei County, Yilan County, Pingtung County and Penghu in Taiwan. A total of 540 questionnaires were sent with 279 valid returns (return rate is about 51.67%). By using SAS statistic package, the result of analysis of variance is shown in Table 2.

Out of 257 samples, 118 respondents refuse to fulfill the requirement and would not join the fishing activity reduction program. The difference is statistically significant between these two groups regarding the following questions: (Q5) the average number of fishing days per trip, (Q10) the most urgent policy about the coastal and offshore fishery, (Q14) year of experience of owner, (Q18) the requirement for 100 days at sea is reasonable, (Q19) the requirement for a cumulative 120 days to suspend the fishing activity is reasonable, (Q20) reduce the day of sea when the fuel price tax exemption had been eliminated since Sep. 1, 2002, (Q24) the willingness of supporting the government to budget on the rewarding schedule continuously, and (Q25) willingness in supporting the government to implement a restriction on fishing activities during the spawning and juvenile seasons are the primary variables that affect fishermen's willingness to accept the Reward of Reducing Fishing Activities Program.

Table 2 Analysis of Variance of the Willingness to Fulfill the Requirement and Accept the Reward of Suspending Fishing Activities in Taiwan

Variables	Reject	Accept	p-value
Q1. Vessel Types	2.65[a] (1.28)[b]	2.59 (1.32)	0.1631
Q2. Vessel Age	2.76 (1.27)	2.70 (1.26)	0.7912
Q3. Fishing Gear	1.93 (1.15)	2.05 (1.22)	0.4465
Q4. Major fishing ground	1.37 (0.64)	1.40 (0.64)	0.8084
Q5. Average fishing days per trip	1.85 (1.15)	1.73 (1.04)	0.0526*
Q6. Average cost per fishing day	2.75 (1.29)	2.67 (1.34)	0.1431

Q7. Average annual days at sea	2.14 (0.58)	2.14 (0.59)	0.9203
Q8. Resource abundance of the offshore fishery	0.98 (0.13)	0.99 (0.12)	0.7544
Q10. the most urgent policy about the coastal and offshore fishery	3.12 (1.39)	3.16 (1.27)	0.0377*
Q11. Reduce the day at sea since the lack of labor provided from Mainland China	0.34 (0.48)	0.34 (0.48)	0.9343
Q12. Sex of owner	1.06 (0.24)	1.04 (0.19)	0.1488
Q13. Age of owner	3.31 (0.98)	3.35 (1.01)	0.7454
Q14. Years of Experience	2.96 (1.20)	2.92 (1.29)	0.07*
Q15. Education	1.54 (0.75)	1.53 (0.72)	0.7975
Q16. Average daily fishing income	2.07 (1.00)	2.39 (0.94)	0.3507
Q17. Acknowledgement of the rewarding schedule since Sep. 1, 2002？	0.78 (0.42)	0.82 (0.39)	0.1660
Q18. The requirement for 100 days at sea is reasonable.	-1.03 (3.13)	0.09 (3.07)	<0.0001**
Q19. The requirement for a cumulative 120 days to suspend the fishing activity is reasonable.	-1.54 (2.88)	-0.08 (2.93)	<0.0001**
Q20. Reduce the day of sea when the fuel price tax exemption had been eliminated since Sep. 1, 2002	-0.09 (3.45)	0.42 (3.16)	0.0041**
Q22. Willingly to reduce the day of sea when the fuel price tax exemption will be eliminated totally since Sep. 1, 2004	-0.46 (3.35)	0.28 (3.2)	0.0035**
Q23. Willingly to accept the requirement and join the Reward of Reducing Fishing Activities Program in 2004	0.07 (0.25)	0.51 (0.50)	<0.0001**
Q24. Willingly to support the government to expand the budget on the rewarding schedule continuously	1.53 (3.24)	2.11 (2.71)	<0.0001**
Q25. Willingly to supporting the government to implement a restriction on fishing activities during the spawning and juvenile seasons	0.84 (3.49)	1.25 (3.12)	0.0123**

[a] the larger the mean within the group represent a more positive answer for each question.
[b] standard error.
* and ** represent the means between two groups are significant different from each others under 10% and 5% significance level.

PROBIT MODEL SPECIFICATION

If the *i*th owner is willing to fulfill the requirement and accept the reward, the dependent variable is defined as y_i =1, otherwise y_i =0. Using the probit model (Maddala 1983), we assume the choice of whether or not to joint the Reward Program to Reduce Fishing Activities depends on the characteristics of the fishing vessel, the social-economic demographic factors of the owner, and the concerns of the fisherman regarding the resource status.

$$y_i = 1 \quad \text{if} \quad y_i^* > y_{i0}$$

$$y_i = 0 \quad \text{otherwise} \qquad (1)$$

where

y_i^* is a continuous variable which represents the unobserved degree of willingness to accept;

y_{i0} represents the critical level of the willingness;

y_i is a discrete choice represents the final of the owner of whether or not .

Suppose y_i^* follow the normal distribution such as $N(0,\sigma^2)$ with the critical value $y_{i0} = 0$, i.e., y_i^* >0 would indicate the owner is willing to accept the offer and fulfill the requirement ; otherwise $y_i^* \leq 0$.

Suppose $$y_i^* = \beta' x_i + \mu_i \qquad \mu_i \sim N(0,\sigma^2) \qquad (2)$$

where x_i represent the explanatory variable that is a vector of $k \times 1$ and the variable definition is shown in Table 3; β' is an $1 \times k$ vector of unknown parameters; and ε_i is the error term and it follows the normal distribution $\varepsilon_i \sim N(0,\sigma^2)$ and the cumulative density function of the standardize random variable is Φ_i.

Table 3 Variable Definition

Variable Name	Definition	Dummy Setting
Dependent Q21	Decision about the offer	= 1, Accept = 0, Reject
Independent Variable Q1	Vessel Tonnage	= 1, more 30 GT and less than 100 GT = 0, otherwise
Q3	Fishing Gears	= 1, torch light or others miscellaneous fishery gears = 0, otherwise
Q4	Fishing ground	= 1, less than 12 nautical miles away from the shore = 0, otherwise
Q10	The most urgent policy about the	= 1, Support for the government to expand

	coastal and offshore fishery	the budget on the rewarding schedule continuously = 0, otherwise
Q13	Age of the owner	= 1, more than 61 = 0, otherwise
Q19	The requirement for a cumulative 120 days to suspend the fishing activity is reasonable.	= 1, disagree and disagree seriously = 0, otherwise
Q22	Willing to reduce the day of sea when the fuel price tax exemption will be eliminated totally since Sep. 1, 2004	= 1, disagree and disagree seriously = 0, otherwise
Q23	Willing to accept the requirement and join the Reward of Reducing Fishing Activities Program in 2004 if the	= 1, Yes = 0, No
Q24	Willing to support the government to expand the budget on the rewarding schedule continuously	= 1, disagree and disagree seriously = 0, otherwise

If the i th owner of the boat would accept the offer, then the probability is defined as follows (Greene, 1992),

$$prob(y_i = 1) = prob(y_i^* > 0)$$

$$= prob(\varepsilon_i > \quad \beta' x_i)$$

$$= 1 \quad F(\quad \beta' x_i)$$

$$= 1 \quad \Phi(\quad \beta' x_i) = \Phi(\beta' x_i)$$

$$= \int_{-\infty}^{\beta' x_i / \sigma} \frac{1}{(2\pi)^{1/2}} \exp(-\frac{t^2}{2}) dt \qquad (3)$$

where F represents the cumulative distribution function of the error term (μ_i) and the probability of the ith owner won't accept the offer is defined as follows,

$$prob(y_i = 0) = prob(y_i^* \leq 0)$$

$$= prob(\varepsilon_i \leq -\beta' x_i)$$

$$= F(-\beta' x_i)$$

$$= \Phi(-\beta' x_i) = 1 - \Phi(\beta' x_i)$$

$$= \int_{-\infty}^{-\beta' x_i / \sigma} \frac{1}{(2\pi)^{1/2}} \exp(-\frac{t^2}{2}) dt \qquad (4)$$

The likelihood function of the whole sample is defined as follows,

$$L = \prod_{y_i = 0} F(-\beta' x_i) \prod_{y_i = 1} \left[1 - F(-\beta' x_i)\right]$$

$$= \prod_{i=1}^{n} \left[\Phi(\beta' x_i)\right]^{y_i} \left[1 - \Phi(\beta' x_i)\right]^{1-y_i} \qquad (5)$$

By using maximum likelihood estimation, the estimated parameters (β and σ) is estimated and its marginal effect is defined as follows:

$$\frac{\partial \Pr ob(y_i^* > 0)}{\partial x_{ik}} = \frac{\partial \Phi(\beta' x_i / \sigma)}{\partial x_{ik}} = \phi(\beta' x_i / \sigma)\beta_k \qquad (6)$$

where ϕ is the p.d.f. of the standardized normal distribution, $\phi(\beta' x_i / \sigma) = \frac{1}{(2\pi)^{1/2}} e^{-(\beta' x_i)/2\sigma^2}$; β_k is the kth parameter in the vector β.

The log-likelihood ratio for $H_0 : \beta_{F,1} = \beta_{F,2} = ... = \beta_{F,k} = 0$ is calculated as follows,

$$-2\log\lambda = -2(\log L_0 - \log L_F) = -2(-186.0427-(-78.54737)) = 214.9906 \qquad (7)$$

Since the $x^2_{0.1}(23)$ =32.007, the null hypothesis is rejected and the estimated model

$H_0 : \beta_{R,k} = \beta_{F,k}$

$H_1 : \beta_{R,k} \neq \beta_{F,k}$

The log-likelihood ratio of the H_o is calculated as

$$-2\log\lambda = -2(L_R - L_F) = -2(-82.30356-(-78.54737)) = 7.51238 \qquad (8)$$

where L_F and L_R are the log-likelihood values for the full model and restricted model for k = Q1, Q3, Q4, Q10, Q13, Q19, Q22, Q23 and Q24.

Since the $x^2_{0.1}(14)$ =21.064, the restricted model could fit the data well enough just like the full model without significant difference. The estimation result of the restricted model is shown in Table 4 and the goodness of fit is about 87.81% such as shown in Table 5.

Table 4 Estimation Result of Probit Model

Independent Variable	parameter	Standard Error	t-ratio	p-value
Constant	-0.751***	0.289	-2.599	0.005
Q1. Vessel Tonnage	0.765*	0.478	1.6	0.055
Q3. Fishing Gears	0.6*	0.369	1.623	0.052
Q4. Fishing ground	0.561**	0.284	1.974	0.024
Q10. the most urgent policy about the coastal and offshore fishery is to support for the government to expand the budget on the rewarding schedule continuously	-0.411*	0.252	-1.628	0.052
Q13. Owner’s age is more than 61	0.578**	0.344	1.682	0.046
Q19. Disagree the requirement for a cumulative 120 days to suspend the fishing activity is reasonable.	-0.792***	0.255	-3.104	0.001
Q22. Disagree to reduce the day of sea when the fuel price tax exemption will be eliminated totally since Sep. 1, 2004	-0.619***	0.239	-2.593	0.005
Q23. Willing to accept the requirement and join the Reward of Reducing Fishing Activities Program in 2004	2.463***	0.261	9.451	<0.001
Q24. Disagree to support the government to expand the budget on the rewarding schedule continuously	-0.485*	0.379	-1.279	0.1
Log likelihood function (L_R) = -82.30356				
Restricted log likelihood = -190.0612				
Chi-squared = 215.5153 (Degrees of freedom = 9)				
Number of observation[2] = 279				

* and ** represent the coefficients is significantly different from zero under 10% and 5% significance level.

Table 5 Numbers of Predicted and Actual Samples from Probit Model

Predict Samples / Actual Samples	$y_i = 0$ (Reject)	$y_i = 1$ (Accept)	Total
$y_i = 0$ (Reject)	108	10	118
$y_i = 1$ (Accept)	24	137	161
Total	132	147	279

The estimated marginal effect is reported in Table 6 and it is interesting to note that if the respondent disagree (Q19) the requirement for a cumulative 120 days to suspend the fishing activity is reasonable, his probability to accept the requirement and join the program will decrease 28.10%. If the reward payment in 2004 were doubled then respondent will be willing to join the program (Q23) and his probability to accept the requirement and join the program will increase 87.44%.

Table 6 The Marginal Effect of the Independent Variables in Probit Model

Independent Variable	$\frac{\partial prob(y_i = 1)}{\partial x_{ik}}$	Standard Error
Constant	-0.2665	0.1063
Q1. Vessel Tonnage	0.2714	0.1678
Q3. Fishing Gears	0.2129	0.13
Q4. Fishing ground	0.1989	0.9967
Q10. The most urgent policy about the coastal and offshore fishery	-0.1458	0.8924
Q13. Owner's age is more than 61	0.2053	0.1222
Q19. Disagree the requirement for a cumulative 120 days to suspend the fishing activity is reasonable.	-0.2810	0.9106
Q22. Disagree to reduce the day of sea when the fuel price tax exemption will be eliminated totally since Sep. 1, 2004	-0.2199	0.8344
Q23. Willing to accept the requirement and join the Reward of Reducing Fishing Activities Program in 2004	0.8744	0.84
Q24. Disagree to support the government to expand the budget on the rewarding schedule continuously	-0.1721	0.1348

CONCLUSION AND REMARKS

Results from the ANOVA analysis show that the number of fishing days per trip, the most urgent policy about the coastal and offshore fishery, whether the rewarding schedule being reasonable or not, the willingness to support the government to expand the budget on the rewarding schedule continuously, and the willingness to support the government in implementing a restriction on fishing activities during the spawning and juvenile seasons are the primary variables that affect fishermen's willingness to accept the Reward of Reducing Fishing Activities Program.

The Probit regression results show that fishermen with fishing vessels that are between 50 and 100 tons are more likely to accept the offer than other fishermen. This may be attributed to the reduction of support on fuel, since larger size fishing vessels have higher fuel costs. Fishing vessel operators whose major fishing gears are torch light or others miscellaneous fishery gears and operate on a seasonal basis are more likely to accept the offer than fishing vessels in trawl and angling fisheries. Fishing vessel operators whose fishing grounds are within 12 miles from the shore and whose owners are older than sixty-one years old are more likely to accept the offer.

On the other hand, fishermen who disagree with the rewarding scheme and the view that fishing effort should be reduced when the support on fuel decreases, and who are unwilling to accept the offer under the reward level set for 2004, showed a lower percentage to accept the offer. This study finds that the accuracy of prediction of the Probit model is 87.81%, an indication that the model can predict fisherman's choice reasonably well. Out of the 279 valid samples, only 161 (57.71%) respondents are willing to accept the offer, which is much lower than the more than 80% that government expected. However, 98.57% respondents realized the deterioration of the coastal and offshore fishery resources and 78% supported restrictions on fishing activities during the spawning and juvenile seasons, indicating a need for a mandatory closed fishing season policy in the future.

To date, the program has not been very successful, as the payments offered to fishermen for curbing fishing activities are so low which are not sufficiently attractive and only 21% of the vessels are willing to fulfill the requirement. Since there is no unemployment insurance program in Taiwan similar to that of Canada, the fishermen in Taiwan will receive no compensation for the short-term suspension of fishing activity. It is only the owners of the boat who are rewarded under the present scheme. Given the limited budget for the reward program, to make the program work, it may be necessary to restrict it to a few selected fisheries with special environmental and resource considerations. By concentrating on a few fishing activities, the program could offer higher incentive to provide sufficient incentives to reduce the fishing effort further.

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APPENDIX 1. EMPLOYMENT INSURANCE FOR FISHER IN CANADA

The Employment Insurance (EI) program in Canada has been in place since the 1940s. It is a program that provides short-term relief to unemployed workers, as part of the social safety nets. In general, self-employed workers are not covered by program, with the exception of fishers. A special provision has been introduced since 1957 to allow fishers claiming EI benefits off fishing seasons if they are qualified.

Under the present regulations (HRDC, 2004a, 2004b), to qualify for the EI claim, a fisher's must earn over a minimum amount of income from fishing during a given qualifying period. The minimum amount, which varies with the regional unemployment rate, for most fishers is $2,500. The qualifying period is defined as any duration of time within the 31 weeks following March 1 (or September 1). A qualified fisher may receive EI benefits two weeks after filing for a claim.

The maximum benefit period is 26 weeks during the period from October 1 to June 15 of the following year (or April 1 to December 15). The amount of weekly benefit depends on fishing and other income during the fishing period and the regional unemployment rate. Normally, it is 55% of the fisher's total income during the fishing period divided by 14 (weeks). The maximum benefit is $ 413 per week while the maximum benefit period is 26 weeks. There is an apparent assumption that fishers are unable to extend their working season beyond 26 weeks. To the extent that a fisher is capable of lengthening the working period, the program appears to provide a disincentive for work.

The premium a fisher must pay to qualify for EI benefit is 2% of total income to a maximum of $15 per week. The net EI benefit for a fisher may be as high as the fisher's total income. Take the example of a fisher who resides in a region with high unemployment rate. If the fisher has earned $3,000 from fishing and $2,000 from other source, his total EI benefit would be $5,107 ($= 5{,}000 \div 14 \times 0.55 \times 26$) after paying $100 ($= 5{,}000 \times 0.02$) in premium. This is because the maximum net benefit/income ratio under the present regulation is approximately equal to one ($= 26 \div 14 \times 0.55 - 0.02$) while the benefit/premium ratio is as high as 50 ($= 26 \div 14 \times 0.55 \div 0.02$).

A recent study on EI benefit by industry released by Statistics Canada shows that, in 1986-96, the average annual EI benefit per fisher is $4,736 (in 1997 dollars), while the average benefit/premium ratio is 14.7 (Corak, M. and W. Chen, 2003; Roy, Tsoa, Schrank and Mazany, 1992). The highest average annual benefit is $6,849 in Newfoundland, while in the highest average benefit ratio reaches 27.41 in Prince Edward Island. The amount of the total net benefits to all claimants in the fishing industry is $113 million per year during this period, which however is, by comparison, small relative to the amount of $1.57 billion paid to claimants in the construction industry.