M E M O R A N D U M

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TO: Groundfish Management Team

FROM: Bob Demory and Jim Golden

SUBJECT: Sablefish Biomass Estimates

Using fixed gear logbook information, we were able to come up with a first approximation of the biomass including sablefish deeper than the 1,000 meter limits of resource surveys used to estimate biomass.

Four vessels operating off Oregon and Washington with pot gear had the following catch distribution by depth in 1984 and 1985:

Estimated Sablefish by Depth

	>1,000 m	≤1,000 m	Total
Pounds	415,870	805,204	1,221,074
Percent	34.1	65.9	100.0

Average coastal catch by gear type for 1981-1984 was:

$\overline{C_T}$ (Trawl)	7,759 mt
$\overline{C_P}$ (Pot)	4,905 mt
$\overline{C_O}$ (Other)	2,021 mt

The estimated biomass inside of 1,000 m was 116,478 mt from the status of stock document (Francis, 1985).

As a first approximation, we assumed that the exploitation rate "u" was the same outside of 1,000 m as it was inside of 1,000 m.

Using the formula:

$$\overline{C_P} > 1{,}000 \text{ m} = 0.341 \times \overline{C_P}$$

and

$$\overline{C_P} \leq 1{,}000 \text{ m} = 0.659 \times \overline{C_P}$$

The pot catch was parsed into inside 1,000 m and outside of 1,000 m components:

$$\overline{C_P} > 1{,}000 \text{ m} = 1{,}673 \text{ mt}$$

$$\overline{C_P} \leq 1{,}000 \text{ m} = 3{,}232$$

Assuming that pot gear is the only gear contributing to substantial removal of sablefish outside of 1,000 m, we developed the following relationship:

$$U = \frac{\overline{C_T} + \overline{C_O} + \overline{C_P} \leq 1{,}000 \text{ m} + \overline{C_P} > 1{,}000 \text{ m}}{B \leq 1{,}000 \text{ m} + B > 1{,}000 \text{ m}}$$

Where B = biomass inside ($\leq$1,000 m) and outside (>1,000 m) of 1,000 m. Now assuming that $U \leq 1{,}000 \text{ m} = U > 1{,}000 \text{ m} = U$

and

$$U \leq 1{,}000 \text{ m} = \frac{\overline{C_T} + \overline{C_O} + \overline{C_P} < 1{,}000 \text{ m}}{B \leq 1{,}000 \text{ m}}$$

$$= \frac{7{,}759 + 2{,}021 + 3{,}232}{116{,}478}$$

$$U \leq 1{,}000 \text{ m} = 0.11171$$

$$U > 1{,}000 = 0.11171$$

$$U > 1{,}000 = \frac{\overline{C_p} > 1{,}000\ m}{B > 1{,}000\ m}$$

$$B > 1{,}000\ m = \frac{\overline{C_p} > 1{,}000\ m}{U > 1{,}000\ m}$$

$$B > 1{,}000\ m = \frac{1{,}673}{0.11171}$$

$$= 14{,}976\ mt$$

$$B = B \leq 1{,}000\ m + B > 1{,}000\ m$$

$$= 116{,}478 + 14{,}976$$

$$= \boxed{131{,}454\ mt}$$

if $U_{msy} = 0.091$ ABC = 11,962 mt

One of the problems with this approach is that we do not know the relative amounts of effort inside and outside of 1,000 m nor do we know the relative catchabilities. What we do know is that an exploitation rate based on a catch that **includes** removals from outside of 1,000 m but **excludes** biomass from outside of 1,000 m will be biased and will overestimate the true exploitation rate.

Literature Cited

Francis, R. C. 1985. Status of the Sablefish Resoureces of the U.S. West Coast and Recommendations for Management in 1986. Status of the Pacific Coast Groundfish Fishery and Recommendations for Management in 1986. Pacific Fishery Management Council, 1985.