

# **Comparison of stock assessment and trawl survey estimates of total halibut abundance at length**

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## **Abstract**

Assessment and trawl survey estimates of total halibut abundance by 10 cm length interval in Areas 3A and 3B combined agree quite well. This agreement indicates that the assessment estimates are not grossly inaccurate.

## **Background**

The large mark-recapture begun by the Commission in 2003 shows a much larger abundance of halibut than the annual stock assessment. In Area 3A the mark-recapture results indicate about four times the abundance estimated in the assessment, and in Area 3B about ten times (Webster 2008). A third estimate of abundance is available from the NMFS trawl survey. The swept area estimates are accurate if survey catchability is equal to one for all sizes. There are some unpublished video observations suggesting it is near one for fish 50-60 cm in length (the mode of trawl length frequencies). It is clearly less than one for very small halibut, and there is some suspicion that it may also be less than one for very large halibut, which may be able to outswim the trawl. This paper reports the trawl survey estimates of abundance by length interval and compares them to the stock assessment estimates.

## **Data and estimation procedures**

The annual stock assessment is done by fitting an age- and sex-structured model to coastwide commercial and survey setline data for the years beginning with 1996. The estimate of abundance in each IPHC regulatory area is calculated by applying setline survey estimates of relative abundance to the coastwide total estimated in the assessment (Clark and Hare 2008).

No trawl survey data are used to estimate abundance in the assessment, but trawl survey data on the distribution of length at age by sex is used to calculate the bycatch at length, so it is a simple matter to calculate estimates of total abundance at length from the assessment estimates of total abundance at age by sex. These totals were grouped by 10 cm length interval (60-69 cm, 70-79, ..., 110-119, 120+) and distributed among regulatory areas using the setline survey estimate of the distribution of each length group in each year.

In recent years, the NMFS trawl survey of the Gulf of Alaska was conducted in 1996, 1999, 2001, 2003, 2005, and 2007. The survey extends from Dixon Entrance (133°W) to the Islands of Four Mountains (170°W), but both Area 2C in the east and Area 4A in the west contain a lot of rough ground, so the trawl survey is most reliable in Areas 3A and 3B. Swept-area estimates of abundance at length in Areas 3A and 3B (actually by INPFC area) are directly available from NMFS.

## **Results**

A scatterplot of the stock assessment and trawl survey estimates (Fig. 1) shows a good deal of scatter, but the overall trend is close to 1:1, meaning that the assessment and the trawl survey show approximately the same level of absolute abundance. Moreover, the same pattern is observed in scatterplots of estimates for only the smaller length groups (Fig. 2) and only the larger length groups (Fig. 3), suggesting that trawl survey catchability is similar for smaller and larger fish.

## **Discussion**

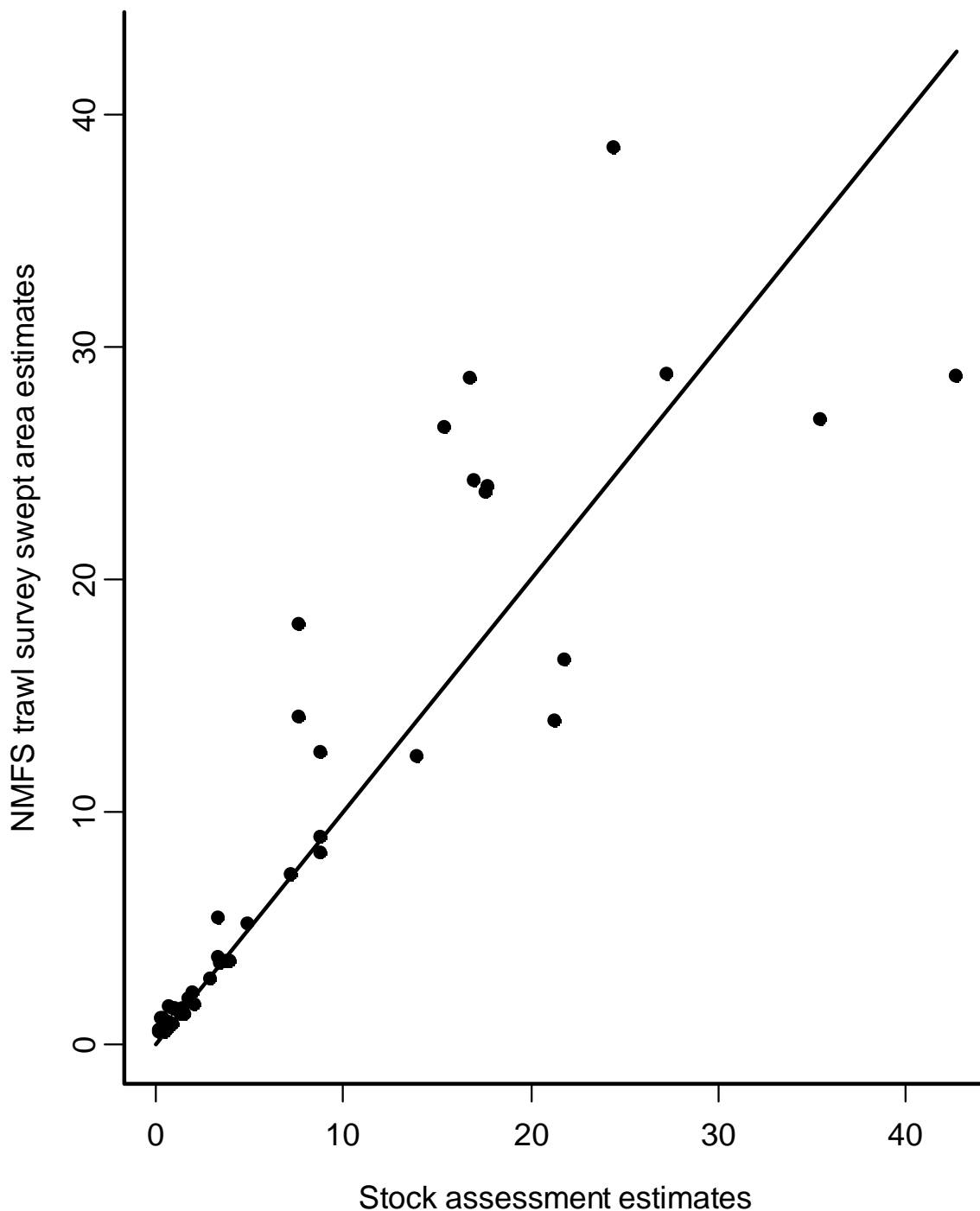
The agreement of the assessment and trawl survey estimates of absolute abundance is surprisingly good. They are completely independent, and each one depends on some strong assumptions (catchability in the case of the trawl survey, natural mortality in the case of the stock assessment). Still, the working assumptions are reasonable, so it seems fair to conclude that both the assessment and the trawl survey are at least roughly accurate and that the mark-recapture estimates for whatever reason are too high.

## **References**

Clark, W.G., and Hare, S.R. 2008. Assessment of the Pacific halibut stock at the end of 2007. IPHC Report of Assessment and Research Activities 2007:177-204.

Webster, R.A. 2008. Analysis of PIT tag recoveries through 2007. IPHC Report of Assessment and Research Activities 2007:259-274.

### Estimates of numbers (M) by 10-cm length interval



**Figure 1. Scatterplot of stock assessment and trawl survey estimates of total abundance at length by 10 cm interval (60-69, 70-79, ..., 120+) in all trawl survey years (1996, 1999, 2001, 2003, 2005, 2007) in Areas 3A and 3B combined. The line is a 1:1 line (not fitted).**

Estimates of numbers (M) by 10-cm length interval

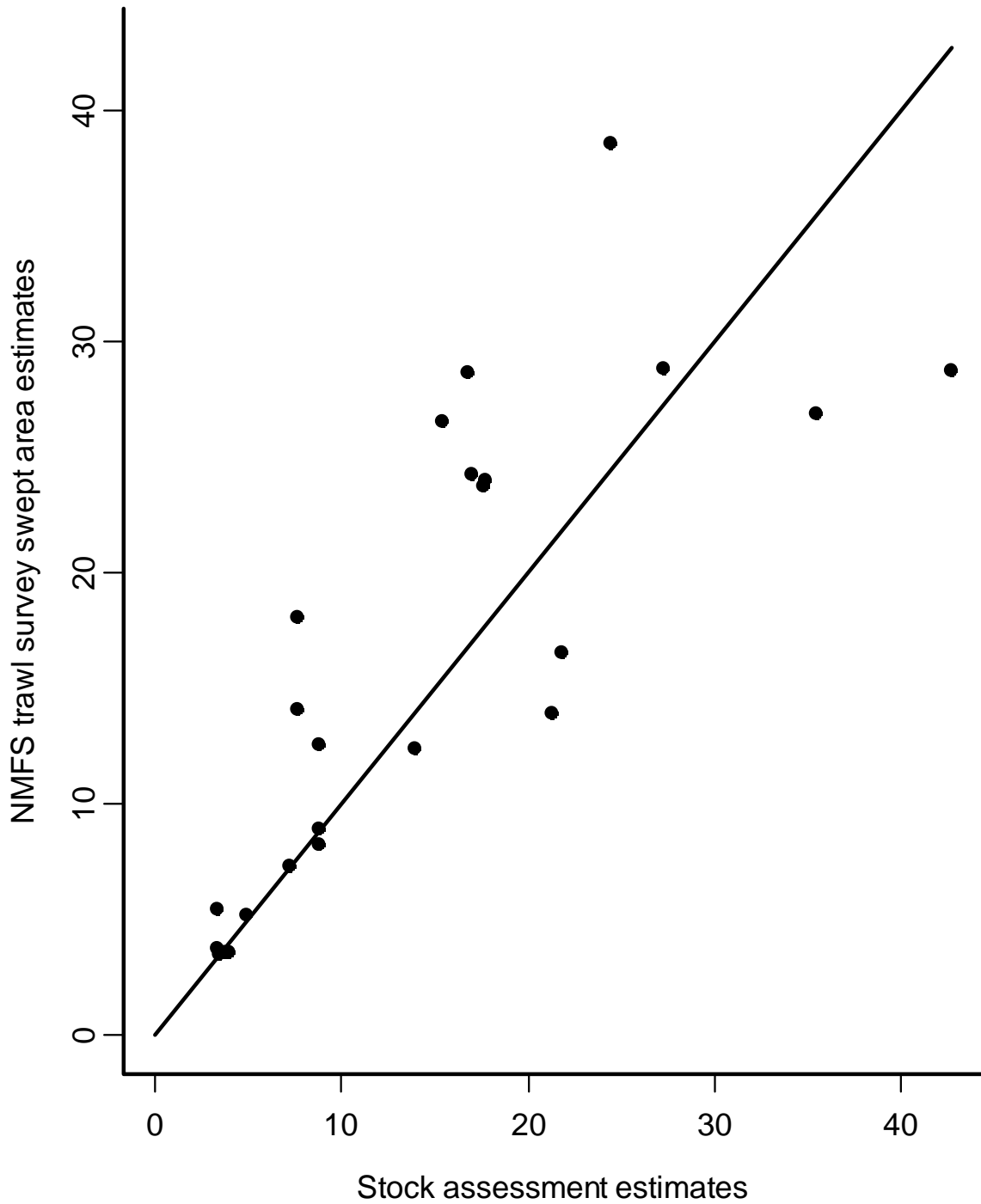


Figure 2. Same as Figure 1, but showing estimates for only smaller fish (< 100 cm).

Estimates of numbers (M) by 10-cm length interval

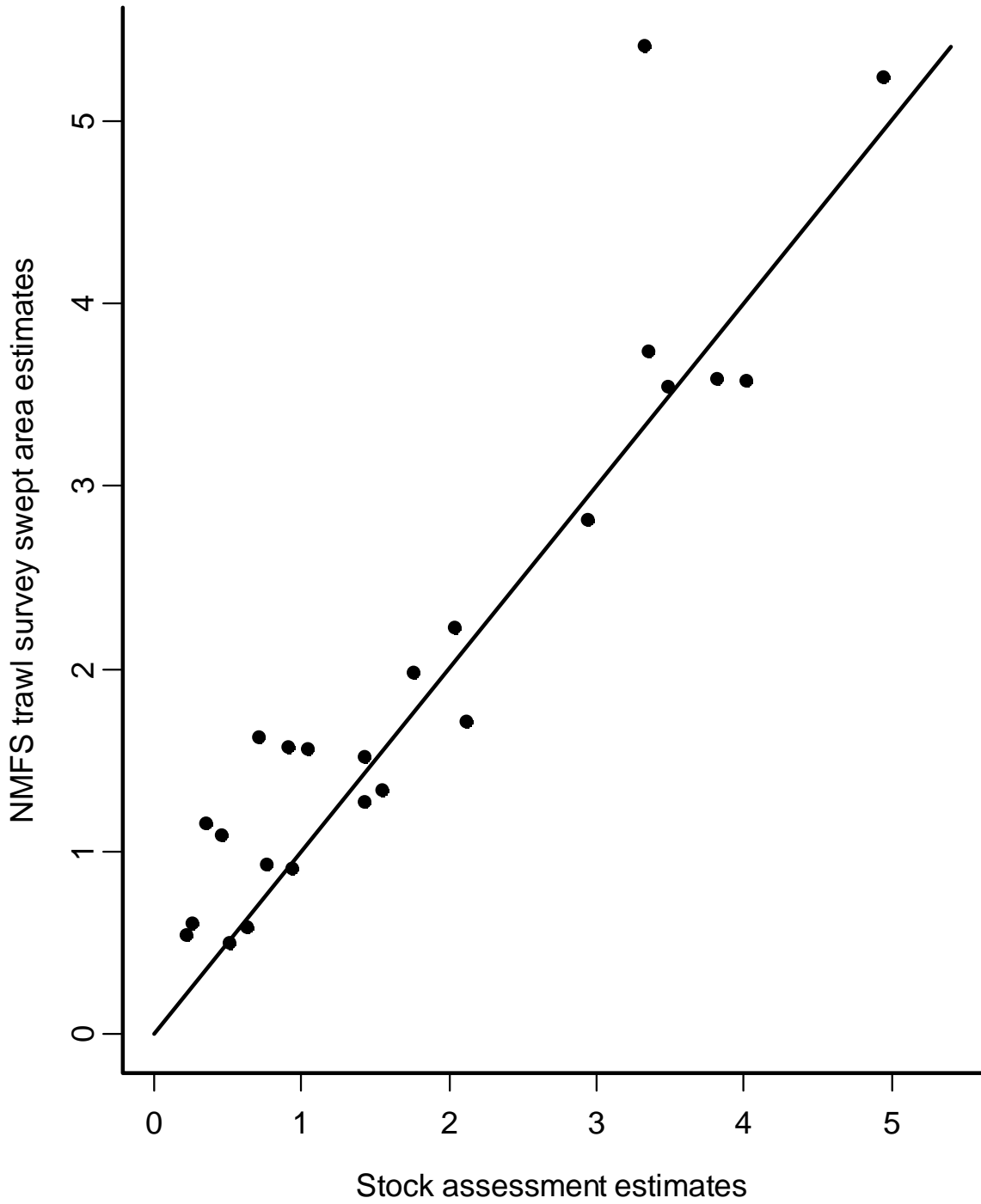


Figure 3. Same as Figure 1, but showing estimates for only larger fish (> 90 cm).