An investigation of fine-scale CPUE for northern shortfin squid (*Illex illecebrosus*) using NEFSC Study Fleet data [8]

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Acknowledgements

- Coauthors

  - Brooke Wright (CRB)
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  - Jeff Pessutti (CRB)
  - Glenn Chamberlain (FSB)
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  - Working Group Members
  - NEFSC internal reviewers

- Industry partners participating in the CRB Study Fleet

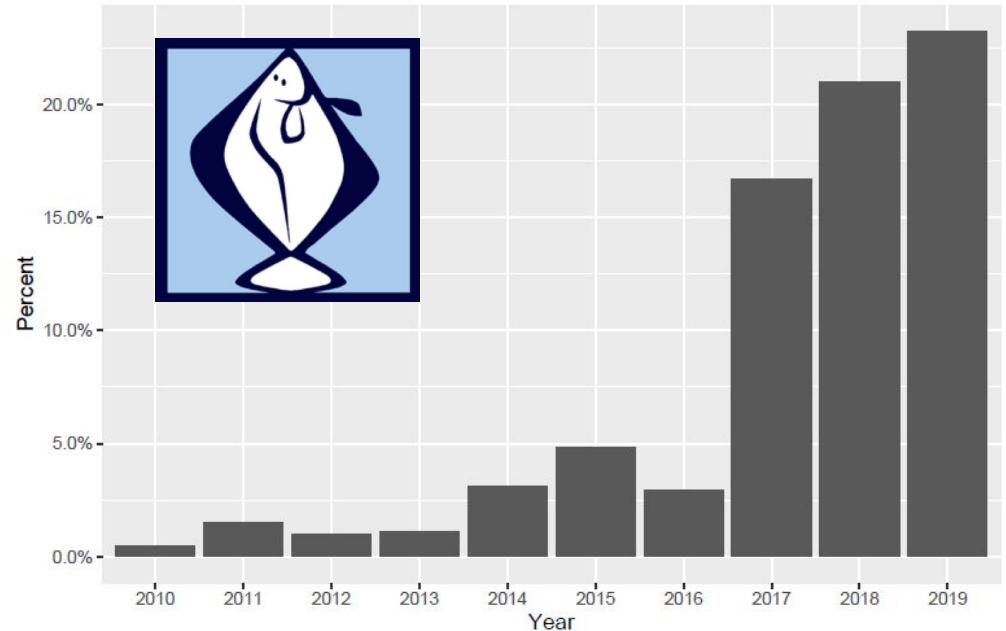 - Many vessels, and companies that have supplied high resolution information as well as valuable feedback

Background and Objectives

- Longstanding interest in using catch data as metric of abundance for Illex

- CRB Study Fleet data set represents a valuable source of information about CPUE as well as fishing behaviour

  - Catch, effort, and environmental data collected at the haul level

  - Subset of larger fishery

- Objectives were to:

  1. Utilize these data to develop CPUE

  2. and inform understanding of fishing behavior

Study Fleet Data Set Details

- Study Fleet data is *high resolution VTR information* reported through the **FLDRS logbook software**

- Study Fleet data spans from **2006 to present**

- Percent of *Illex* landings captured by Study Fleet vessels reporting at the haul level has **increased through time**

- Spatial pattern similar to VTR

Percent of Illex landings in CRB HBH data sets

Study Fleet Data Set Details

Vessel Participation Across Years
For Study Fleet vessels

Comprehensive data set · Targeted data set
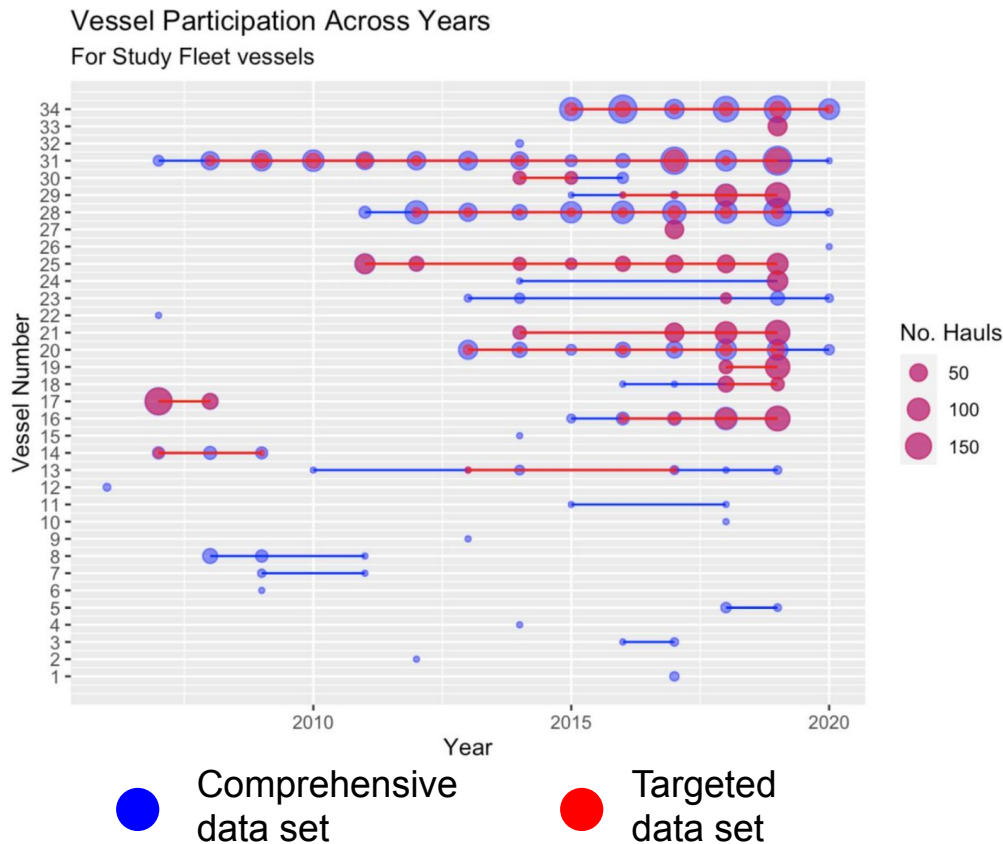
Current Study Fleet Data:

Year	Number Trips	Number Efforts	Number Vessels
2006	1	2	1
2007	32	198	4
2008	30	146	4
2009	31	113	7
2010	13	92	2
2011	21	145	5
2012	26	201	4
2013	25	187	6
2014	29	200	12
2015	46	263	9
2016	59	409	10
2017	113	604	13
2018	174	834	15
2019	190	1395	15
2020	10	58	5

Study Fleet Data Set Details

- **Haul-by-haul** catch broken into two data sets
  - 'Comprehensive'
  - 'Targeted'
- Previous work has considered **'Illex trips'** as having **> 50% Illex** by weight
- Good to capture that subset, but likely valuable information in smaller catches too
- Fit models to multiple data sets to compare results

Percent Illex by weight vs. the summed weight of Illex
For each haul from the Study Fleet data
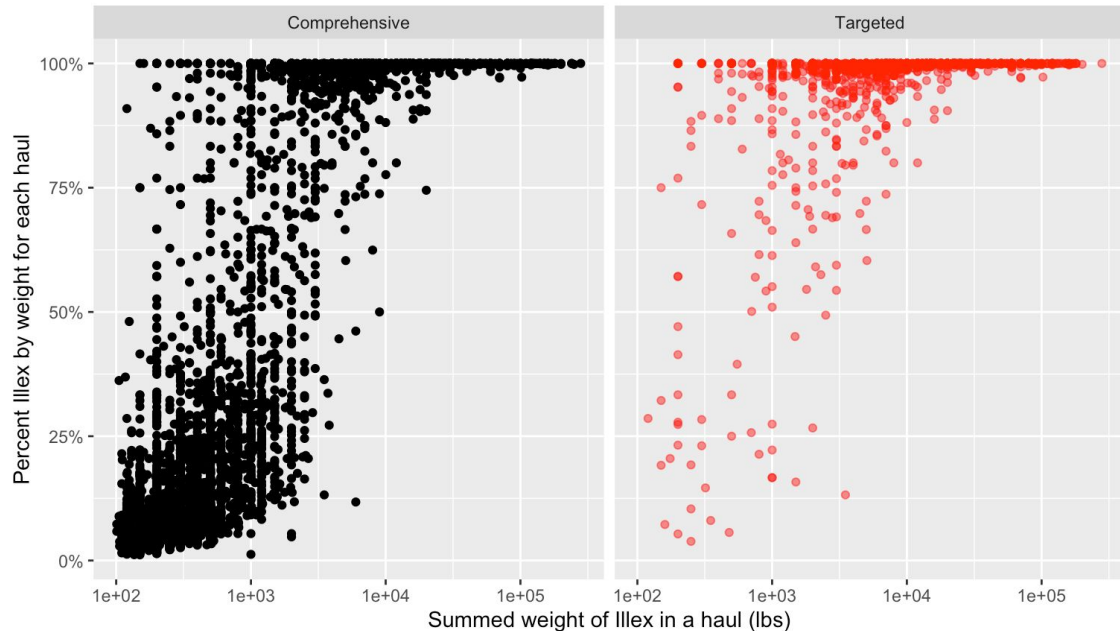
Brief Summary of Fishing Behavior

- **Haul-by-haul** catch info provides info relevant to interpreting other data sets (e.g., VTR)

- Analysis focused on 'targeted' data set

- Details about the fishing behavior
    - Fishing during day
    - Time between hauls ~4 hrs
    - Haul length in hours ~ 2 hrs

- **Limited change through time** values similar to those in Powell *et al.* 2003

CPUE Results

- Methods for fitting available in working paper

- **~65-75% of deviance explained** with these variables

- Other variables tested included:
  - Vessel characteristics
  - Tow characteristics

- Each added a limited amount of information (< 5% change in deviance explained) and were removed from other models
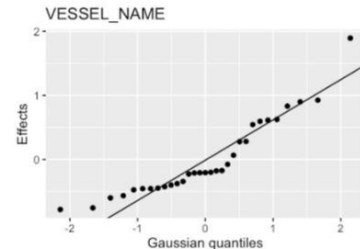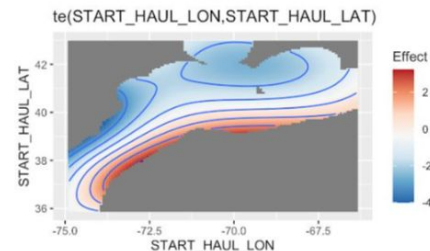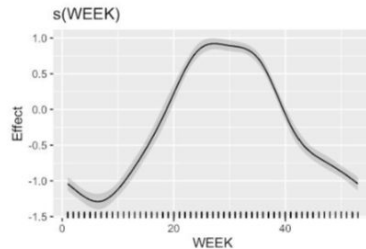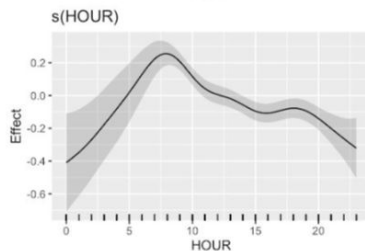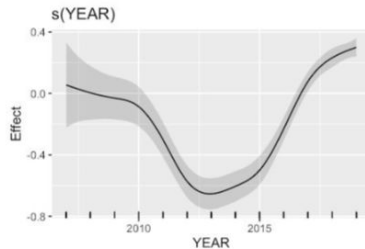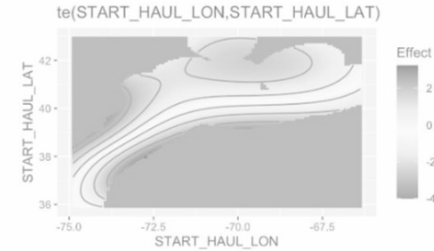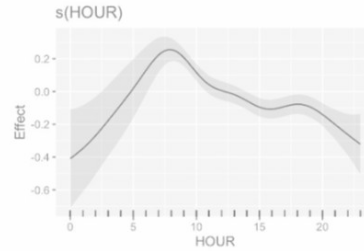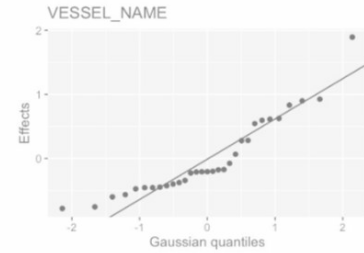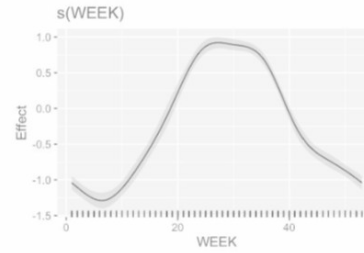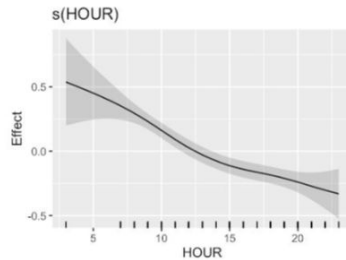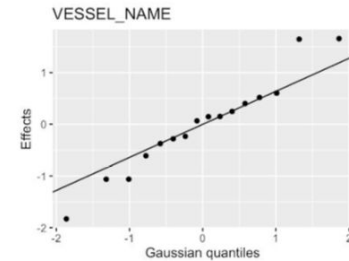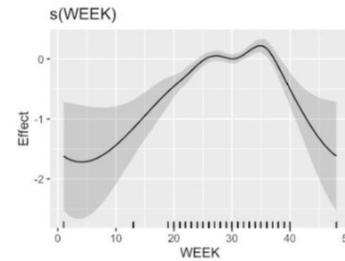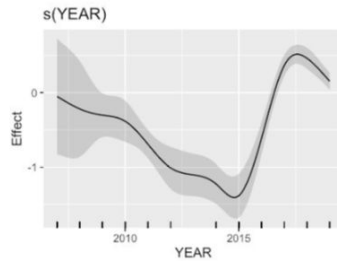

'Comprehensive' data set

CPUE Results

- **Deviance explained was lower** when fit to the targeted data set (**~45%**)

- Very **similar splines for each data set**

- Further exploring these variables (esp. environmental info) is something we would like to pursue in the future
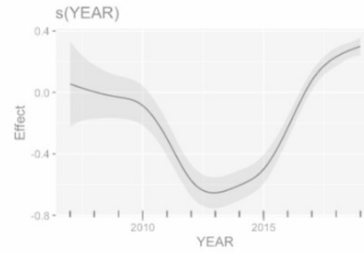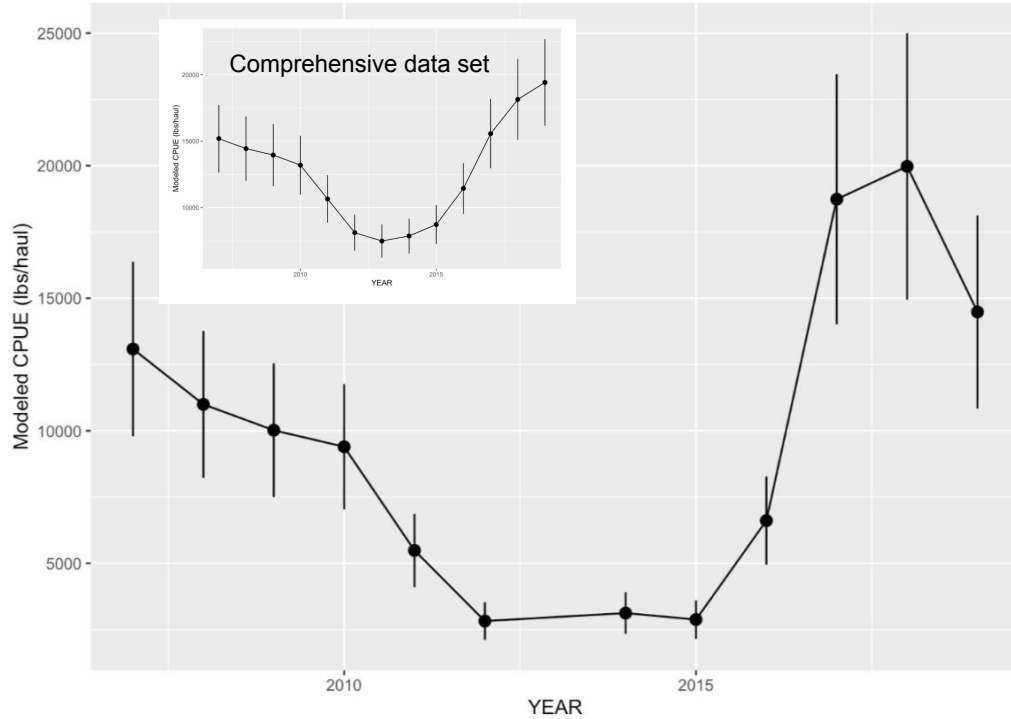

Comprehensive data set
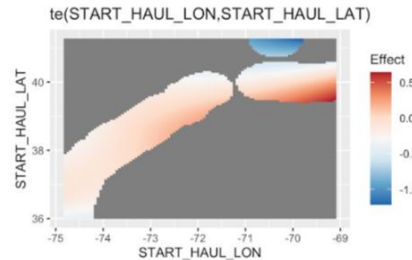
Targeted data set

Modeled CPUE Trends
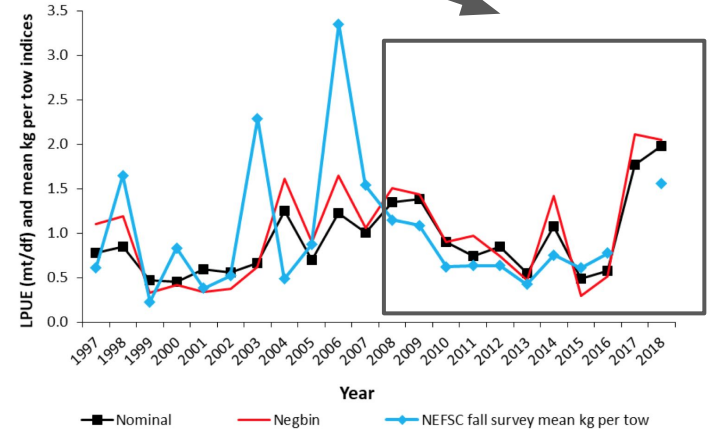

Targeted data set

Comprehensive data set

Figure 14. Nominal and standardized LPUE (red line) indices (mt/day fished) for *Illex illecebrosus* in relation to stratified mean kg per tow *I. illecebrosus* indices derived from NEFSC fall bottom trawl surveys during 1997-2018. The 2017 fall survey index was not computed due to a lack of sampling a majority of *I. illecebrosus* habitat. All indices are scaled to their means.

VTR LPUE from Hendrickson [10]

Seasonal CPUE Patterns

- In-season trends in CPUE similar shape from 2017-2019

- Pattern exists in other years but is more limited

- Steep slope early in season and consistent high CPUE could potentially be used to identify 'good' years

- Complement body size information [Rago 16]

- Advantage in that this data stream already exists (SF hauls reported rapidly and available for analysis)
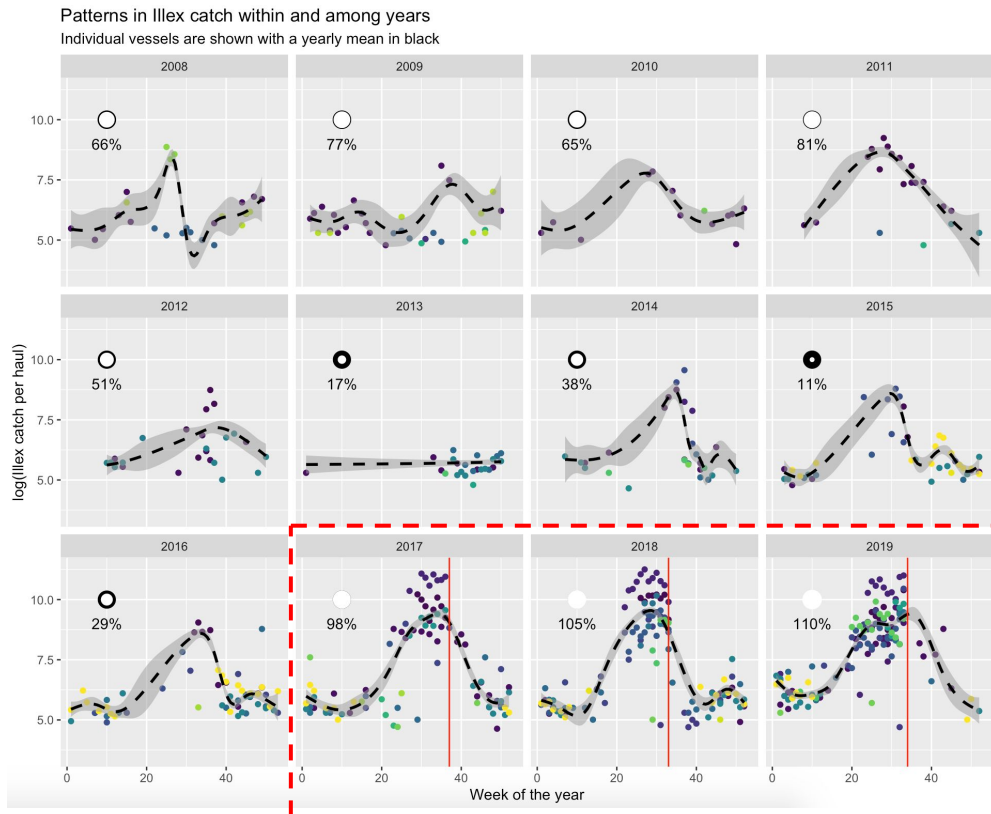
Comprehensive data set

General discussion

- Study Fleet data useful source of haul level data

- Fishing behavior has remained similar over time

- CPUE pattern similar to that seen in other data sets (e.g., VTR LPUE)

  - Importantly suggests that a subset of vessels could be used to track trend

- Standardized CPUE fairly robust to the way trips hauls are selected

- Seasonal pattern varies across different years, could potentially be used for in season management

Photo: Calvin Alexander

Thank you for listening!

Photo: NOAA

Questions?