Monkfish Assessment SARC 50

SAW50 Terms of Reference

1. Characterize commercial catch
2. 2009 Cooperative Monkfish Survey
3. Other survey data
4. Estimate F, B, R
5. Update BRPs
6. Evaluate stock status
7. Diet composition and consumption
8. Projections and ABCs
9. Research recommendations

2010 Assessment – Key Points

- Catch: decline in recent years (regulations)
- Survey indices:
  - Relatively low, no indication of increase due to low catch
- 2009 coop survey:
  - Estimates uncertain due to efficiency estimation
  - Length freq's used in SCALE model
- Diet: monkfish = major piscivore (2-6% of all consumption by finfish)

2010 Assessment – Key Points

- SCALE model:
  - North, South, Combined
- North:
  - Shift in estimated selectivity curve
  - Strong retrospective pattern
  - B_{2009} ~ ¼ to ½ of B_{2009} projected in 2007
 - F_{2009} ~ 2-3 * F_{2009} projected in 2007

2010 Assessment – Key Points

- South:
  - 2 selectivity periods (vs. 3 in 2007)
  - Retrospective moderate
  - B_{2009} ~ 70-80% of B_{2009} projected in 2007
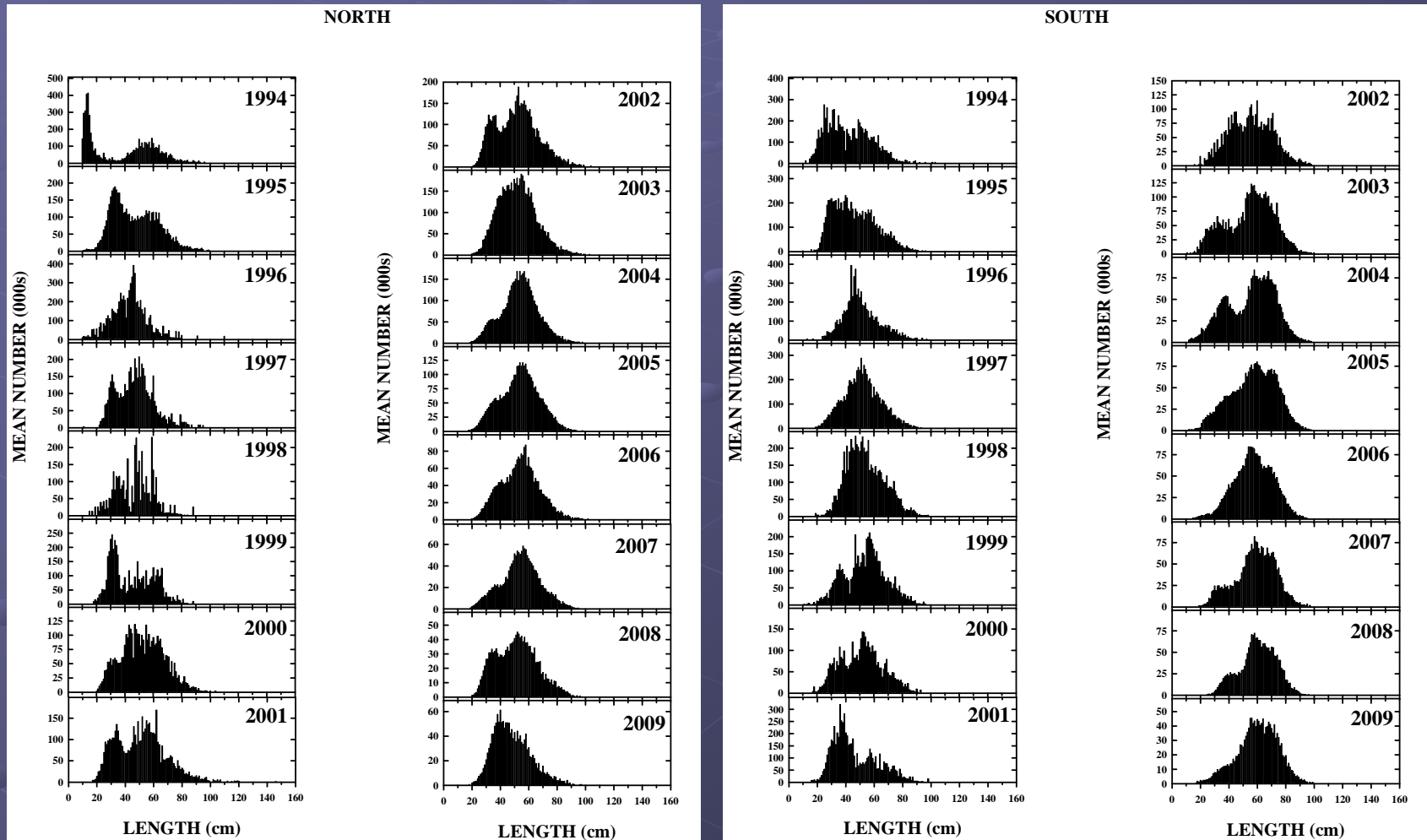 - F_{2009} ~ F_{2009} projected in 2007

2010 Assessment – Key Points

- BRPs – updated based on new SCALE output and revised YPR
- Stock Status: Not overfished, overfishing not occurring
- Projections: improved method

TOR # 1: Catch
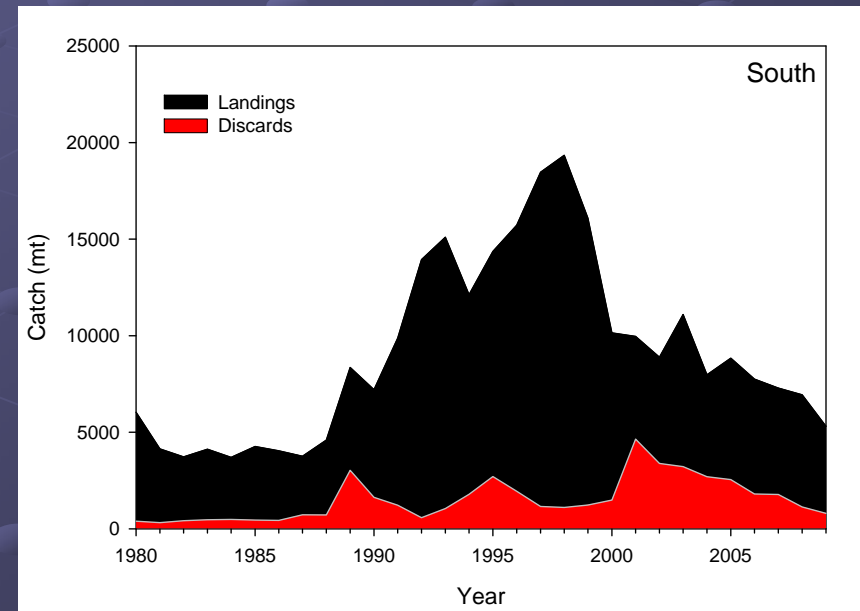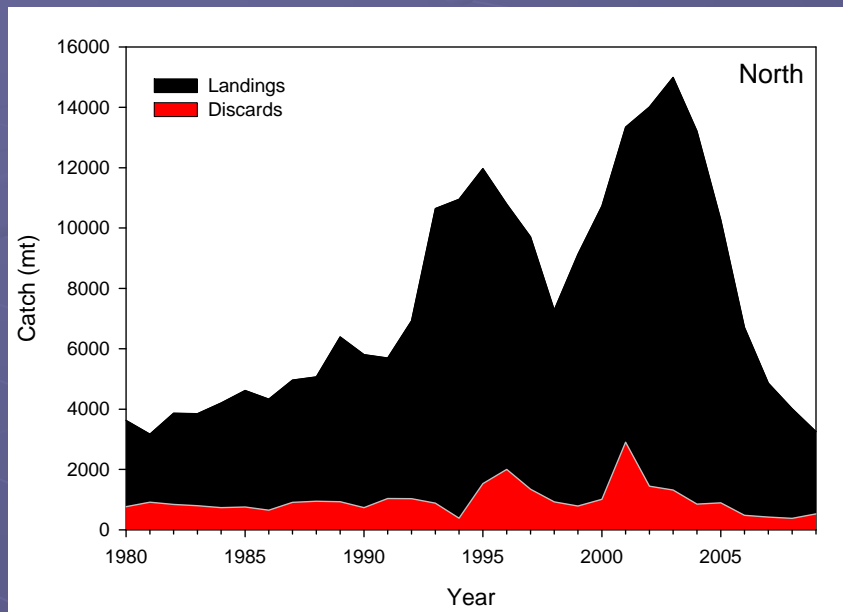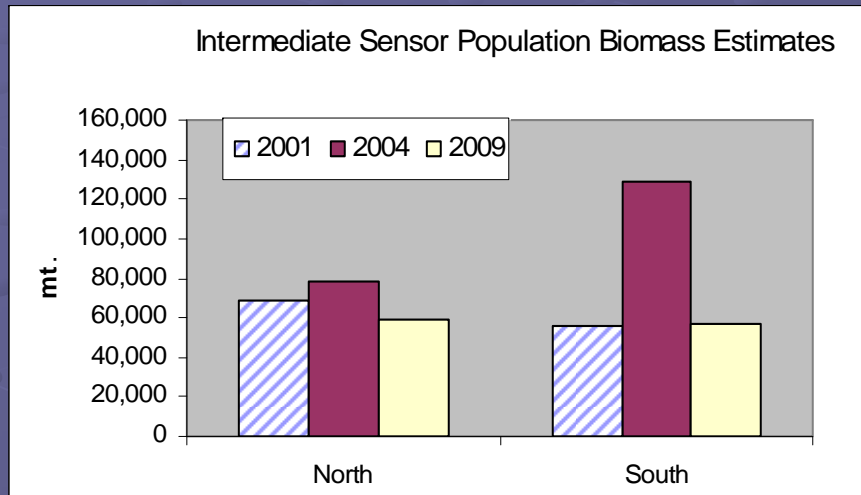
Length Composition Commercial Catch Observer Data

TOR # 2
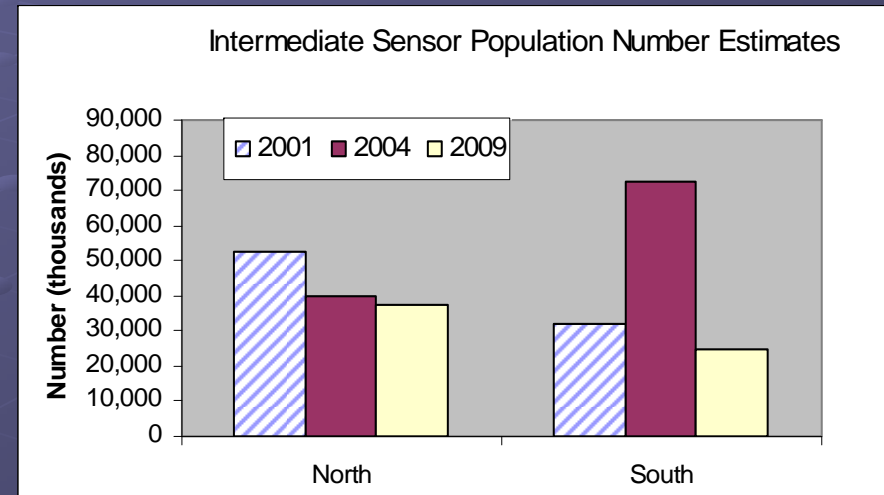# 2009 Cooperative Monkfish Survey
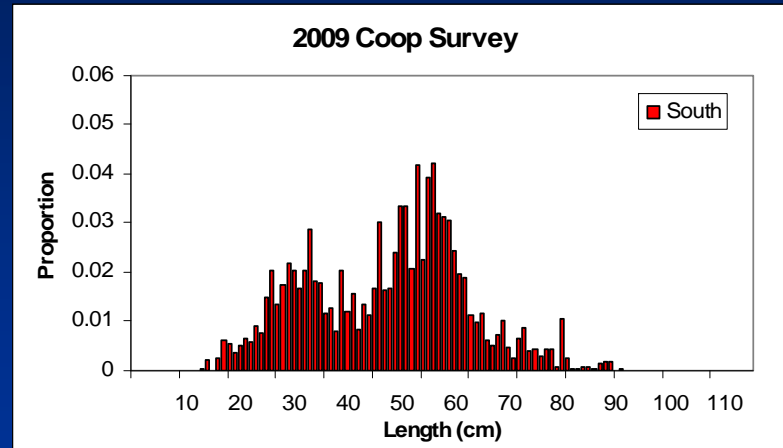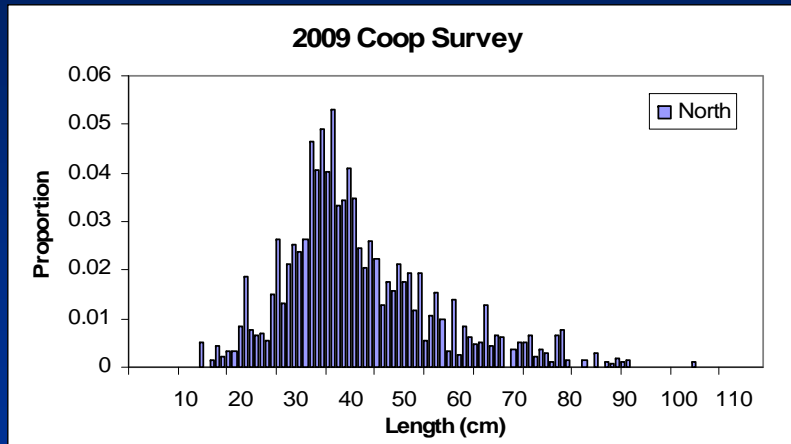
Efficiency-Corrected Population Size

Biomass

Numbers

Intermediate Sensor Population Biomass Estimates

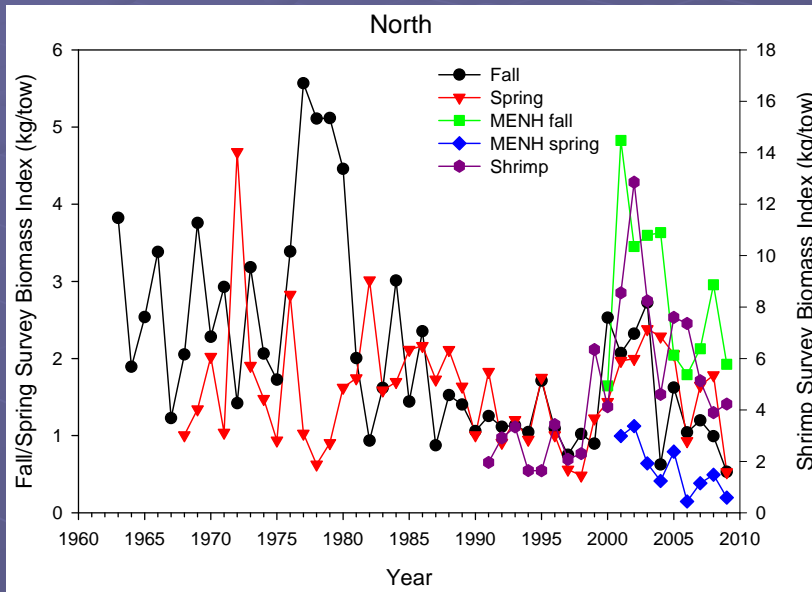Intermediate Sensor Population Number Estimates
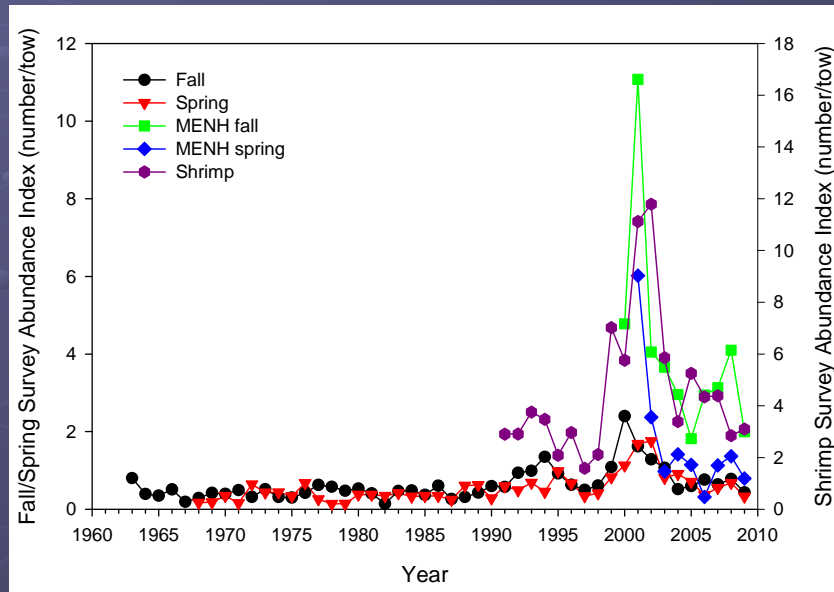
Length Composition

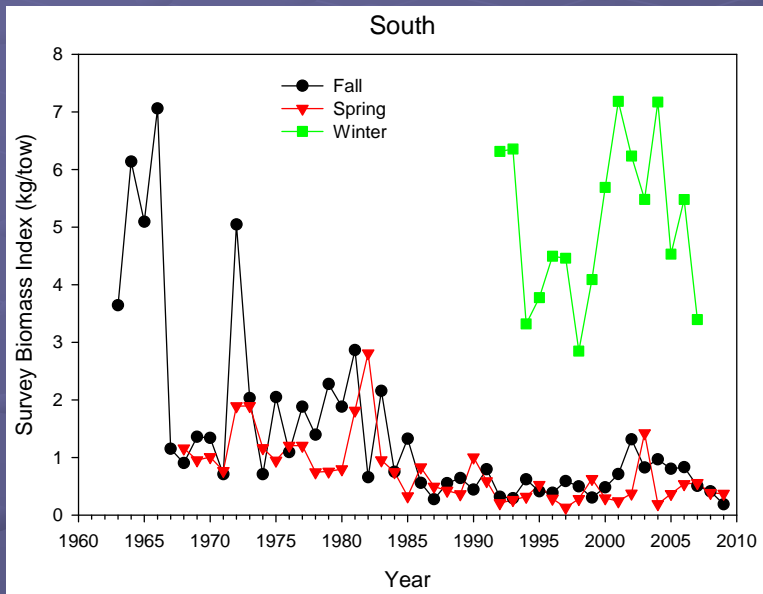# TOR # 3: Other survey data
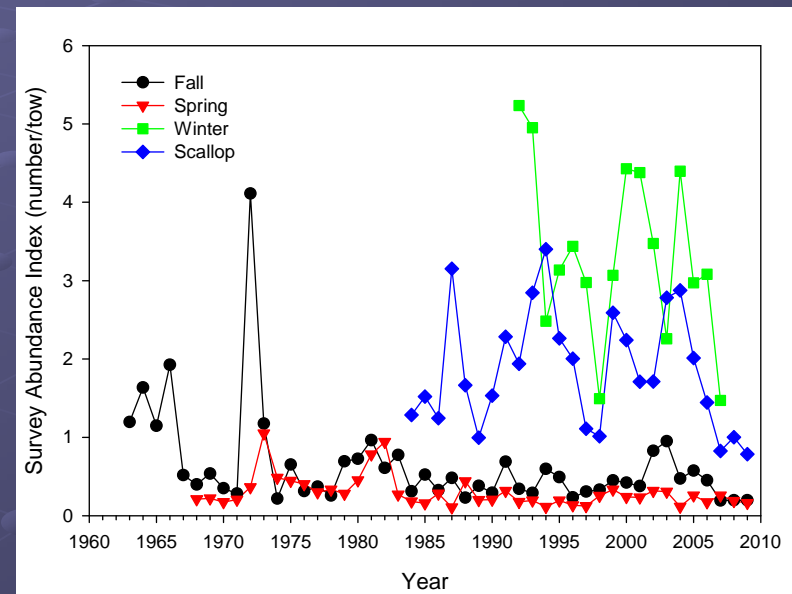
Other Survey Data North

Biomass

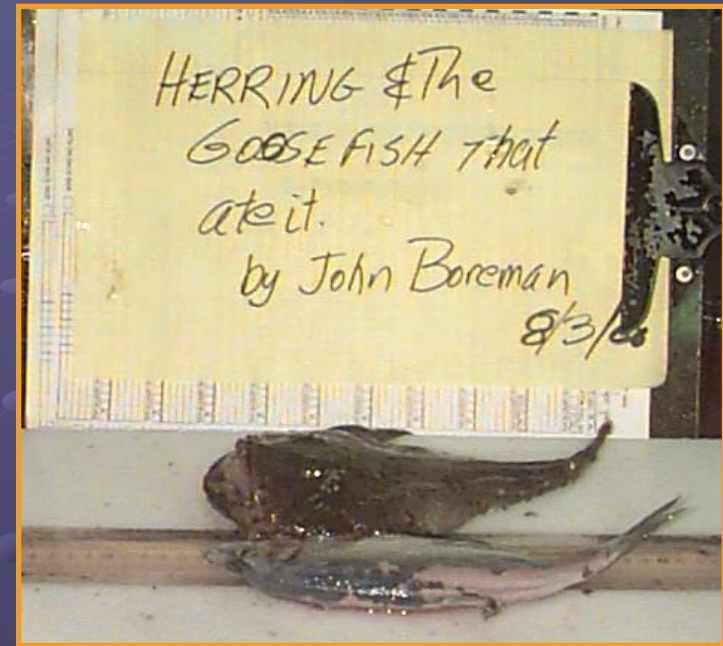Numbers

Other Survey Data South

Biomass

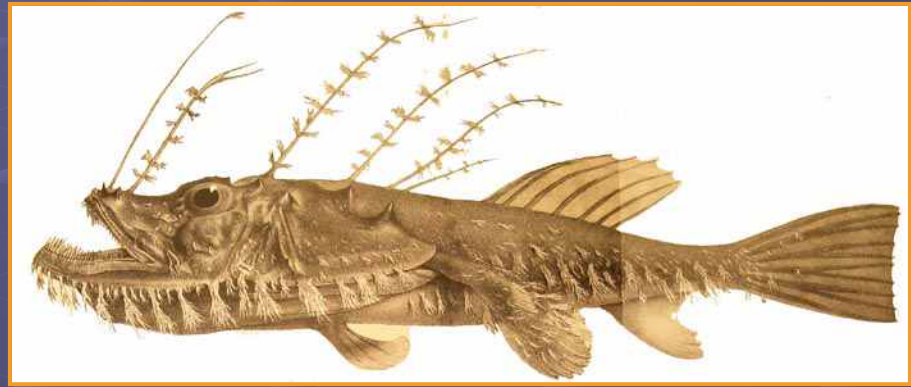Numbers

TOR # 7 Monkfish Diet

- Dominant piscivore
- Consumption of squids, silver hake, skates ~ landings
- Consumption of herring, mackerel, monkfish ~20-50% of landings

TOR # 4

- Estimate
  - Fishing mortality
  - Recruitment
  - Stock biomass
  - Uncertainty

SCALE model used

Statistical Catch At LEngth (SCALE)

- Forward projecting age-based model
- Does not require annual age composition data
- Tuned to length composition data

How SCALE Works

- Recruitment in year 1 produces the initial population age-length matrix
- At each time step
  - Population is decremented for length-specific mortality
  - Total number of survivors is redistributed across ages and lengths using assumed growth model and normal variation in length at age
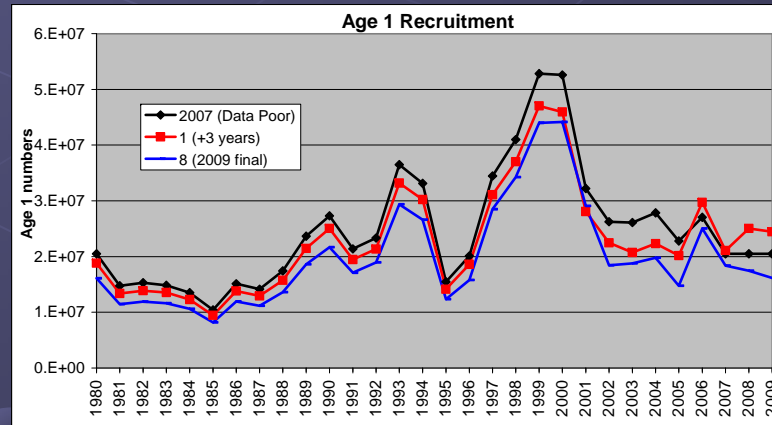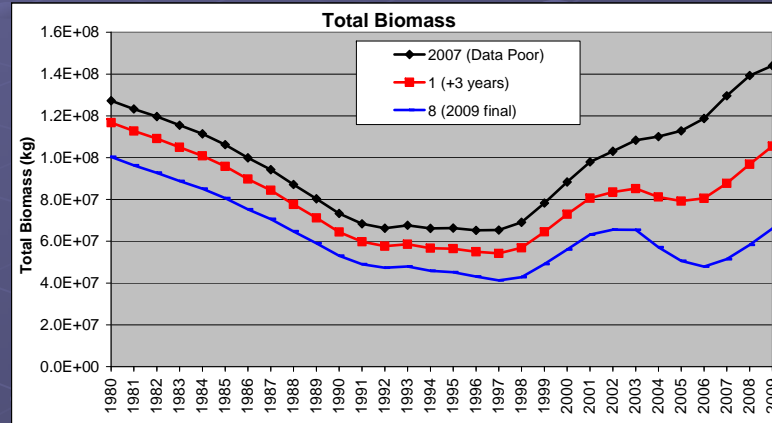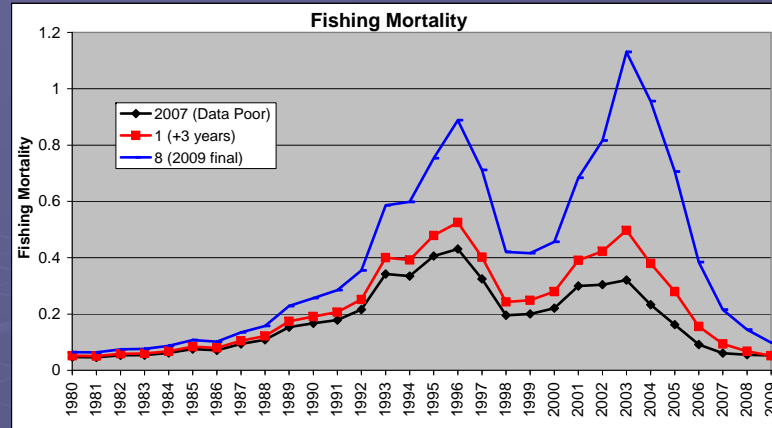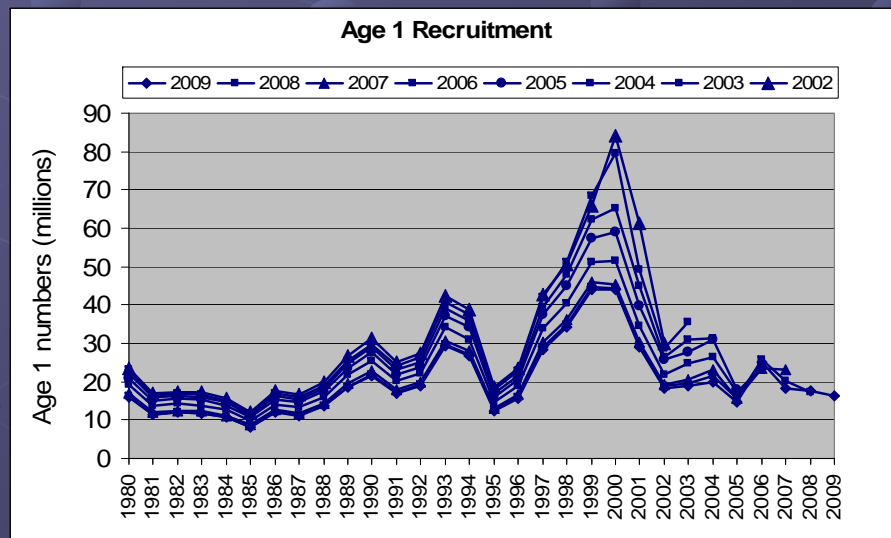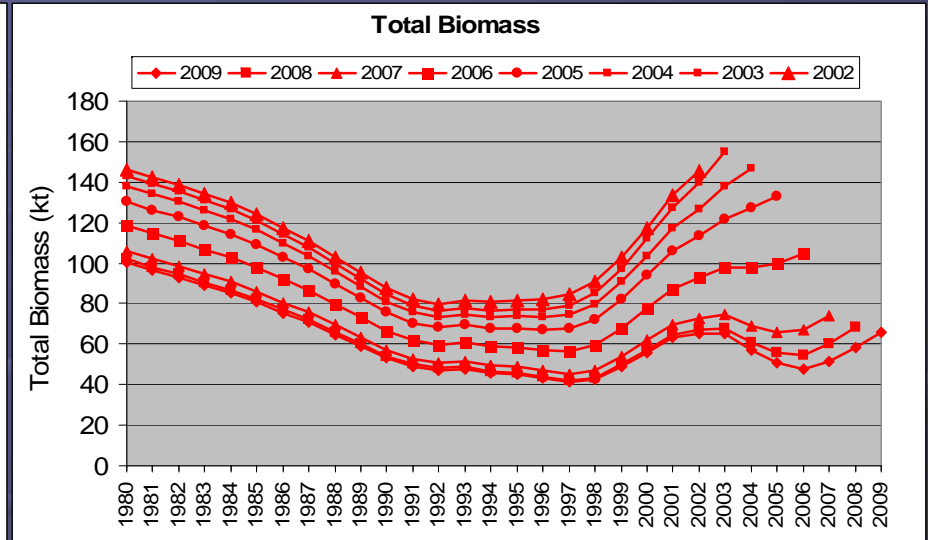
SCALE
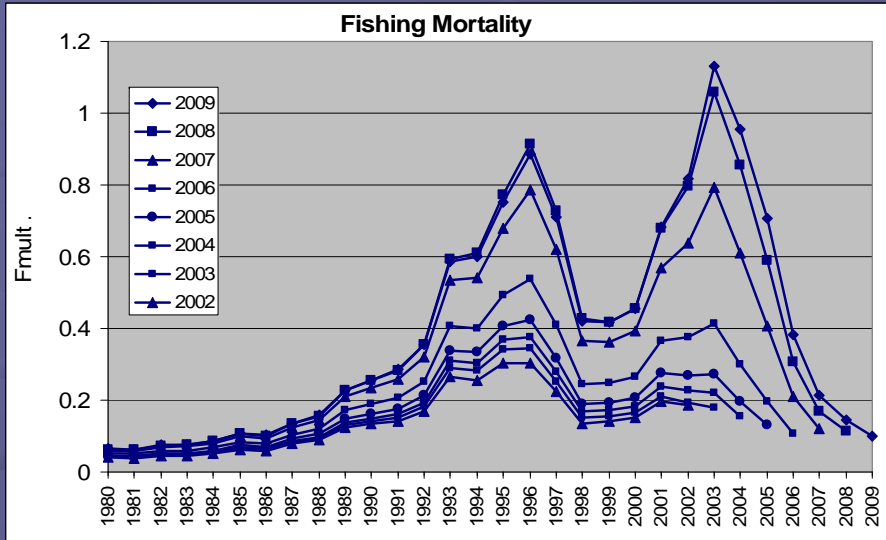
- Tuned to:
    - Total catch
    - Catch length frequency
    - Fully selected (30+) survey length frequencies
    - Fully selected (40+) survey abundance indices
    - Age 1, 2, 3 abundance indices ('recruits')
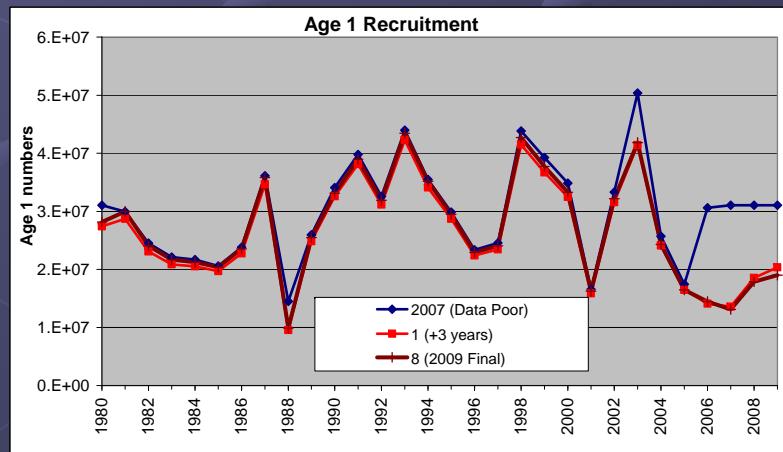
North
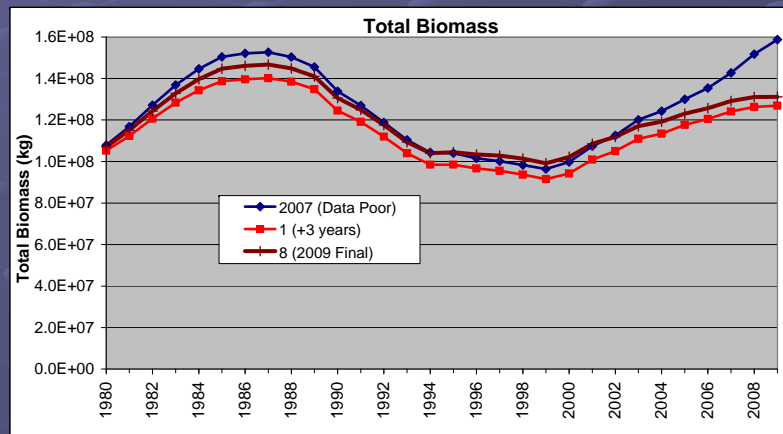

Northern Mangement Area

Fishing Mortality

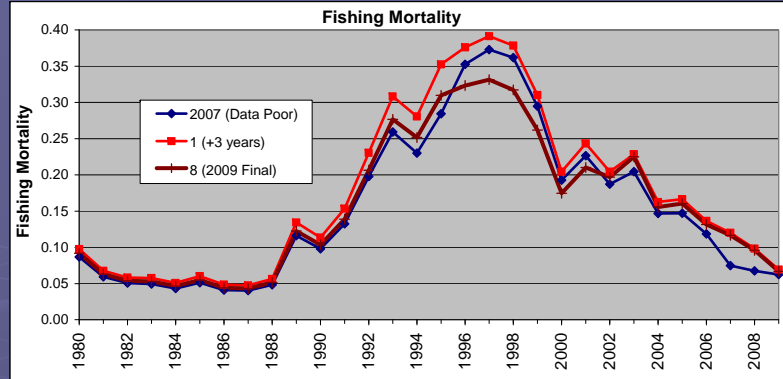- 2007 (Data Poor)
- 1 (+3 years)
- 8 (2009 final)

Total Biomass

- 2007 (Data Poor)
- 1 (+3 years)
- 8 (2009 final)

Age 1 Recruitment

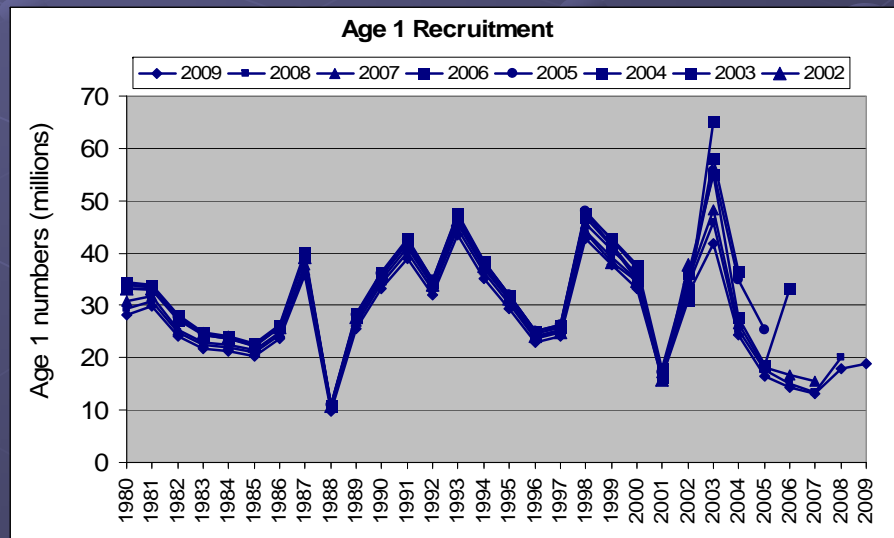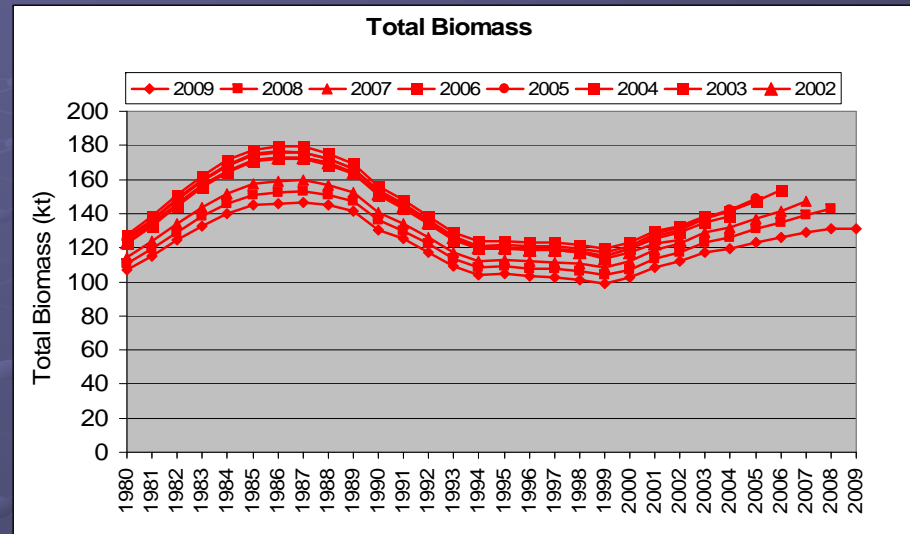- 2007 (Data Poor)
- 1 (+3 years)
- 8 (2009 final)

North Retrospective
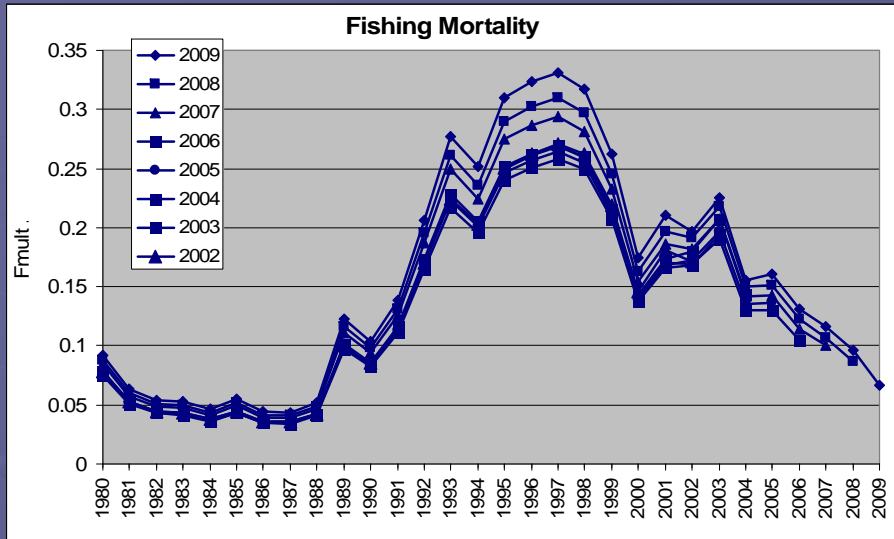
South

South Retrospective

SCALE - Uncertainty

- Data limitations
  - Short time series (1980-)
  - Under-reported and unreported landings
  - Unknown discards
- Fundamental biology
  - Growth model (age method not validated)
  - Longevity (M=0.3 was assumed)
  - Stock structure / distribution
- Model fit / retrospective in North

Uncertainty

- Lack of fit to catch length distributions in terminal year of the model

- Persuading the model to fit the catch lengths would result in higher Fs and lower biomass.

PHOTO: AUSTRALIAN CUSTOMS SERVICE

TOR # 5
Biomass Reference Points

- DPSWG (2007):
  - B_{target} = avg total B during model time period
  - $B_{threshold}$ = "B_{loss}" = lowest total B from which stock increased

	DPSWG (2007)	SAW 50
North Btarget	92.2 kt	62.0 kt
North Bthresh	65.2 kt	41.2 kt
South Btarget	122.5 kt	121.3 kt
South Bthresh	96.4 kt	99.2 kt

Biomass Reference Points

- GARM:
  - B_{target} = long-term projected B at FMSY
  - $B_{threshold}$ = 0.5* B_{target}

HabCam photo, S. Gallagher, WHOI

	SAW 50 (GARM)	SAW 50 (DPSWG)
North Btarget	52.9 kt	62.0 kt
North Bthresh	26.5 kt	41.2 kt
South Btarget	74.5 kt	121.3 kt
South Bthresh	37.2 kt	99.2 kt

F Reference Points

- F_{MSY} proxy = Fmax from age-based YPR with M=0.3

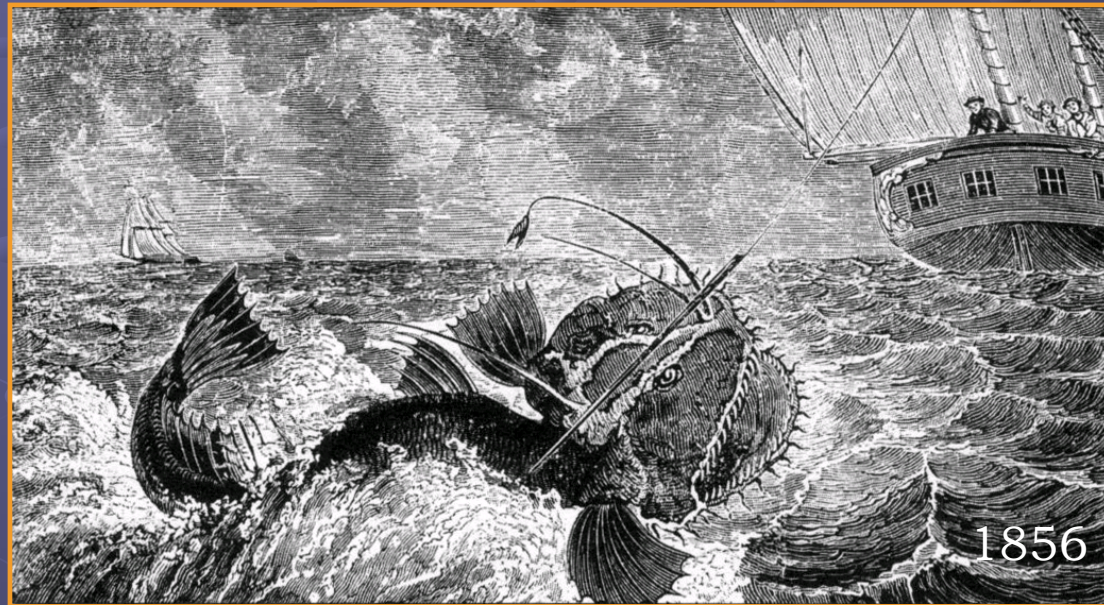|	DPSWG (2007)	SAW50
North	0.31	0.43
South	0.40	0.46

HabCam photo, S. Gallagher, WHOI

BRP Uncertainty / Adequacy

- Uncertainty:
  - Model adequacy and stability
    - Aging issues / other biology
    - Truncated time series
    - Difficulty fitting recent catch If's
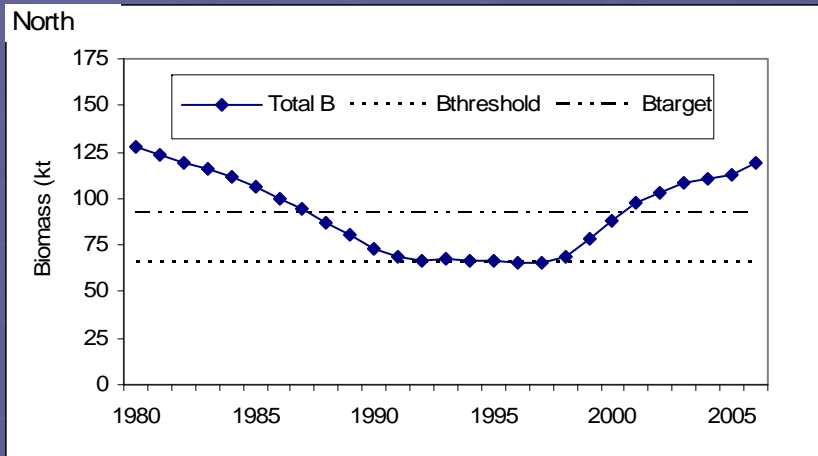   - Retrospective in North
  - Assumed M (0.3)

TOR # 6

- Evaluate stock status re.
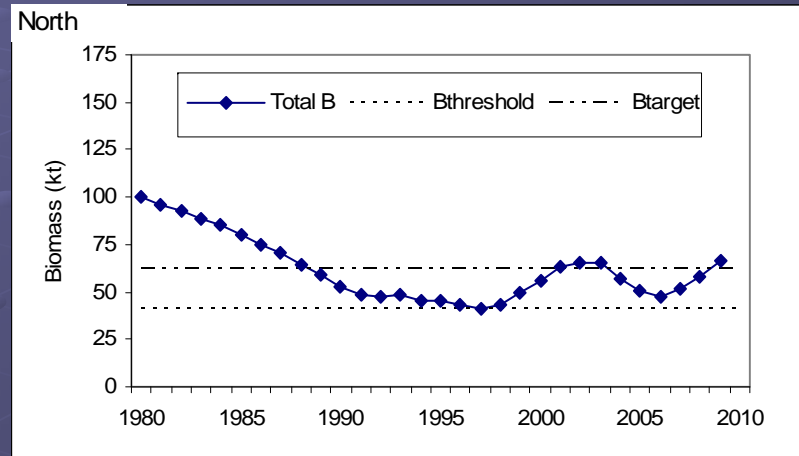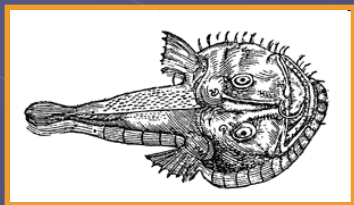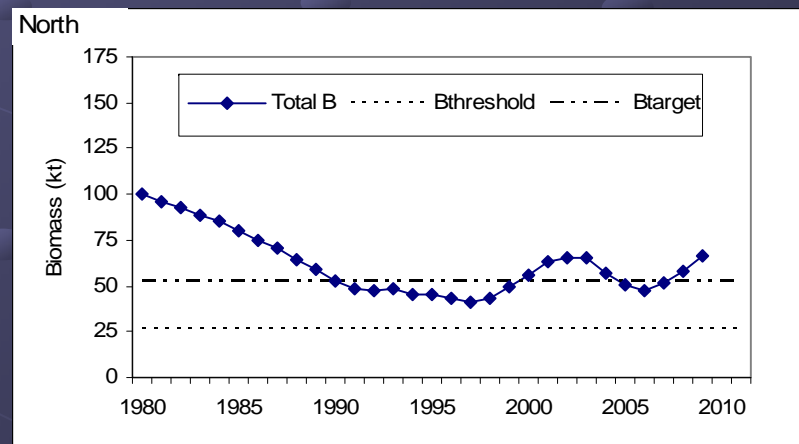 - existing BRPs
  - updated BRPs

1856

North
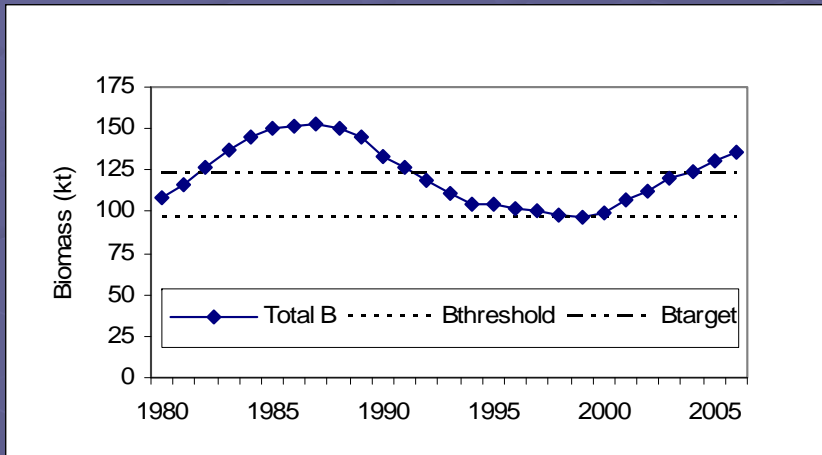
2007 using BLoss

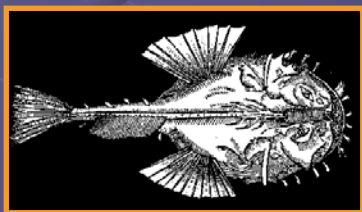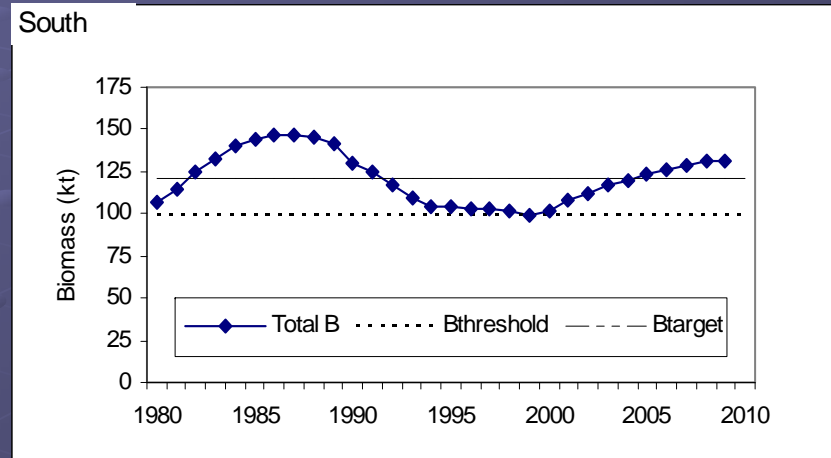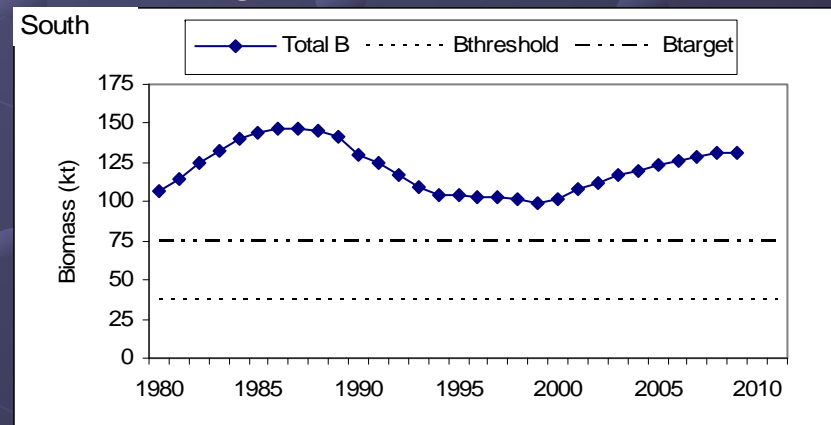
2010 using BLoss

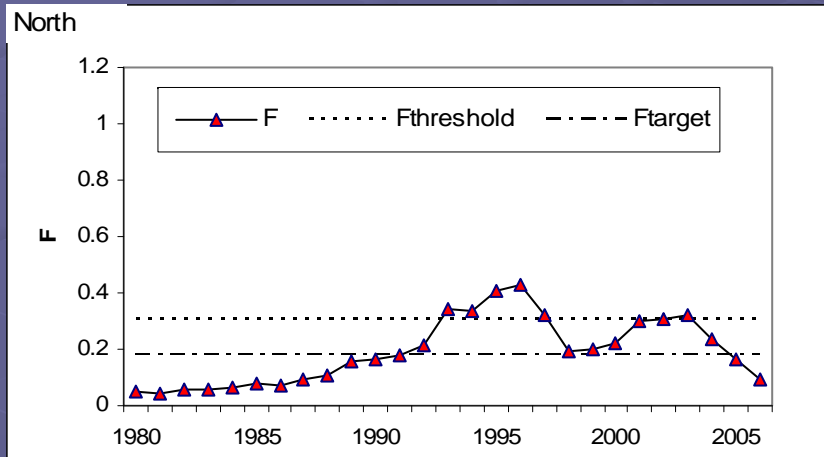## 2010 using Bmax Projected

South

2007 using BLoss
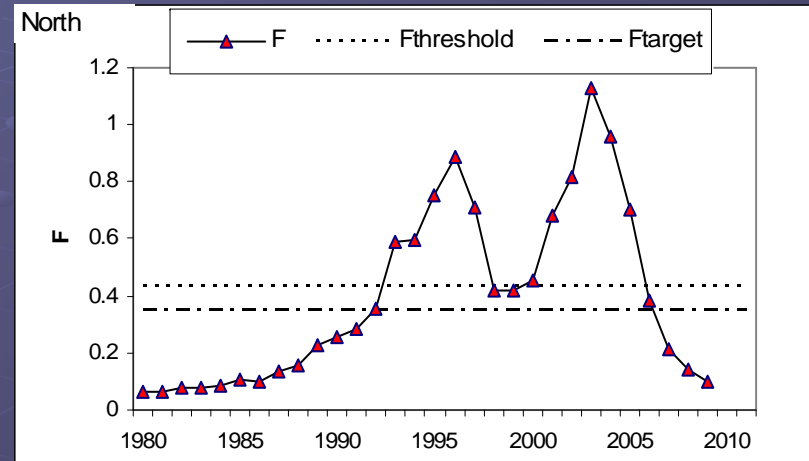

2010 using BLoss

2010 using Bmax Projected

North

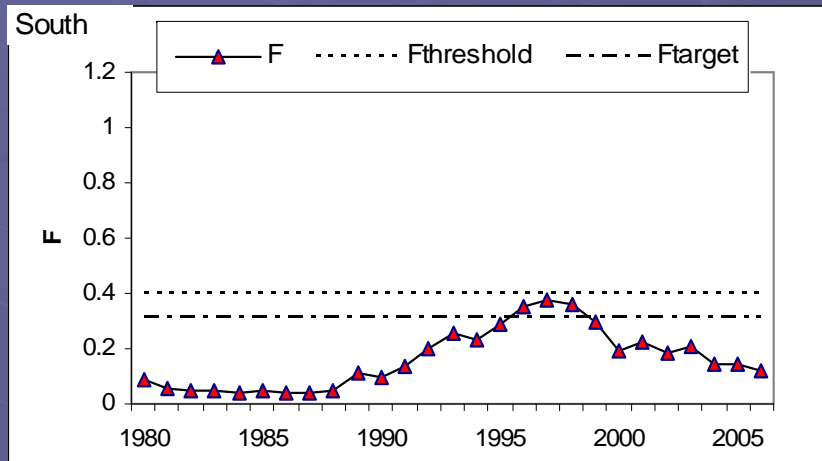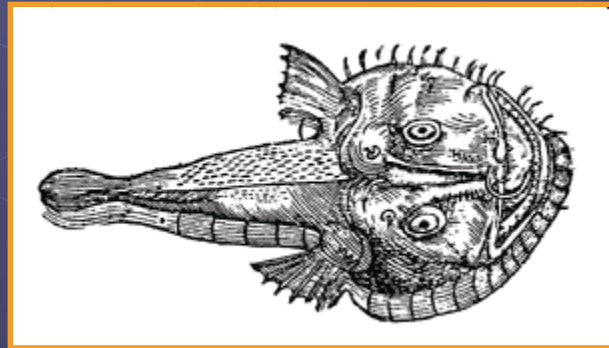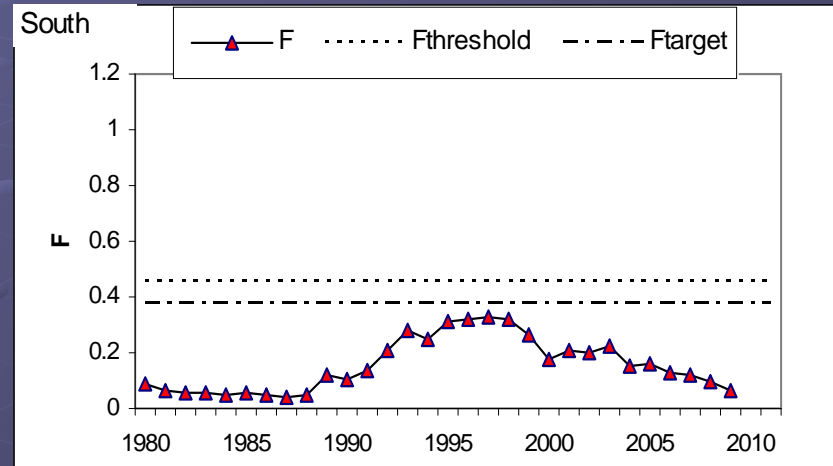# South

TOR # 8 - Projections

- AGEPRO projections of SCALE results
  - MC simulation of population age structure from SCALE output to evaluate P(achieving targets)
  - Assumes long-term stochastic recruitment
- Scenarios
  - F = Fthreshold
  - Catch = ACT
  - Catch = ABC

Projections - North

P (being on the wrong side by 2016)

> 50%	< 50%

Scenario	<0.5*Bmax	$<B_{loss2006}$	$<B_{loss2010}$	$>F_{max}$
ACT = 10,750 mt	🟩	🟩	🟩	🟩
ABC = 17,485 mt	🟩	🟥	🟥	🟥
Fthreshold = 0.44	🟩	🟥	🟥	

Projections - South

P (being on the wrong side by 2016)

> 50%	< 50%

Scenario	0.5*Bmax	$B_{loss2006}$	$B_{loss2010}$	$>F_{max}$
ACT = 11,469 mt	🟩	🟩	🟩	🟩
ABC = 13,326 mt	🟩	🟩	🟥	🟥
Fthreshold = 0.46	🟩	🟥	🟥	

Projections - Uncertainty

- ## Assessment highly uncertain
  ### therefore projections uncertain

Reality Check - North

Reality Check - South