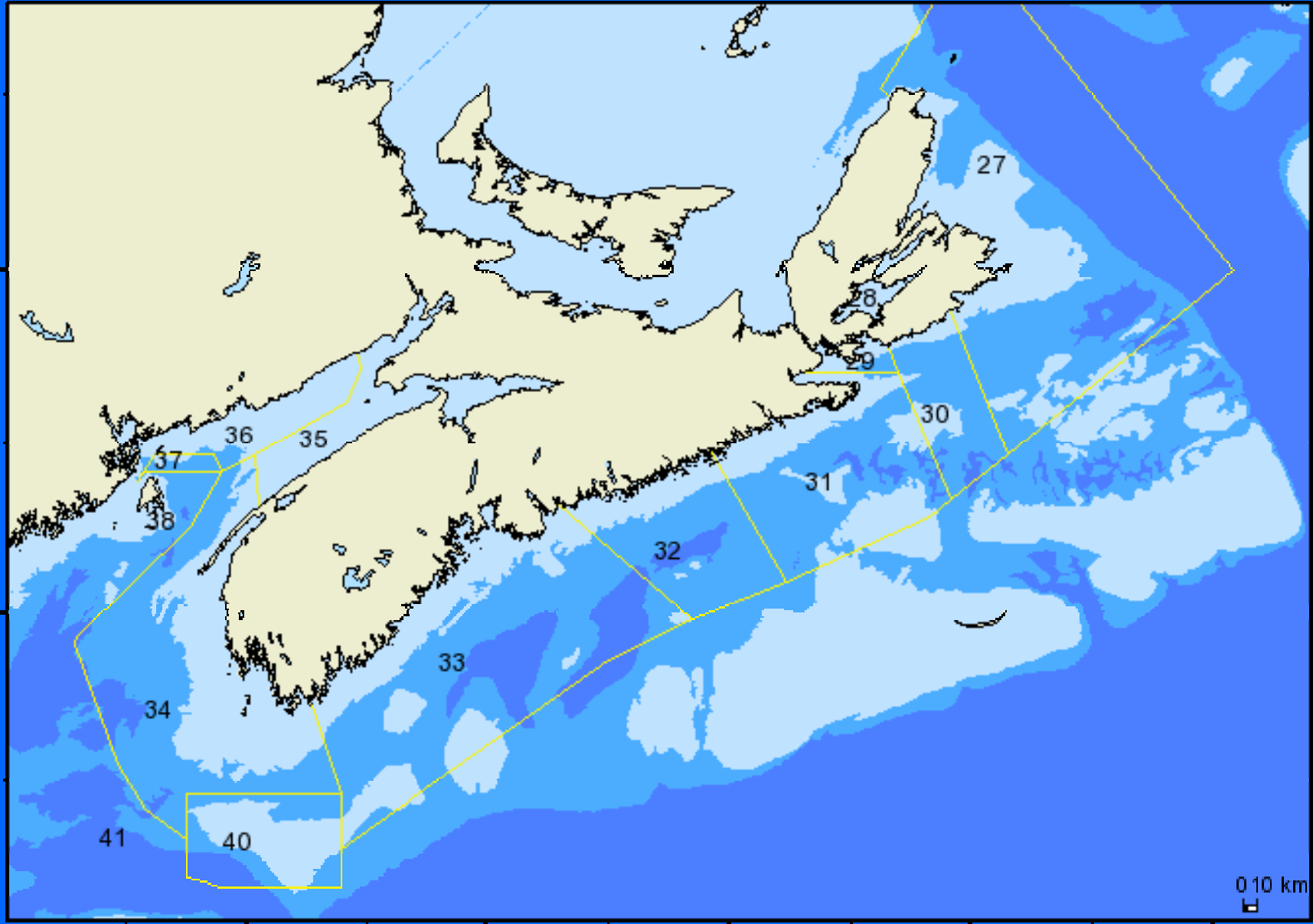


# Lobster - Maritimes Region

## Talk Outline:

- Implementation of the 1995 conservation strategy
- Status of fishery and major management measures
- Ecosystem considerations
- Potential roles for industry

# LFA map



# Implementation of the 1995 conservation strategy

Dec. 1997: "Prior to the 1998 fishery, lobster fishermen are being asked to prepare conservation harvesting plans to include multi-year conservation measures that will lead to doubling of lobster egg production..."

Our measure: Eggs-per-Recruit (E/R)

No. of eggs produced by the average female over her life span

≠ total egg production per stock

# Implementation of the 1995 conservation strategy

- Some changes resulted in every LFA
- These include:
  - Minimum size increases
  - closed window
  - v-notching
  - Return of culls
  - Max. size
  - Trap modifications
  - Increased data collection

From: Report of the Lobster Conservation Working Group (Dec. 2001)  
[recent evaluation]

### Doubling achieved in one LFA

	E/R - % towards doubling	Exploitation rate
LFA 27	100+	53-78 (N); 23-45 (S)
LFA 28	20-30	N/A
LFA 29	20-30	23-45
LFA 30	20-30	29-45
LFA 31a	60 [40]	32-41
LFA 31b	23 [20]	32-41
LFA 32	23 [20-35]	54-58
LFA 33	25	63-70
LFA 34	25-35	68
LFA 35	17-28	53 & 70
LFA 36	17-28	53 & 70
LFA 38	17-28	53 & 70
LFA 41	?	<20

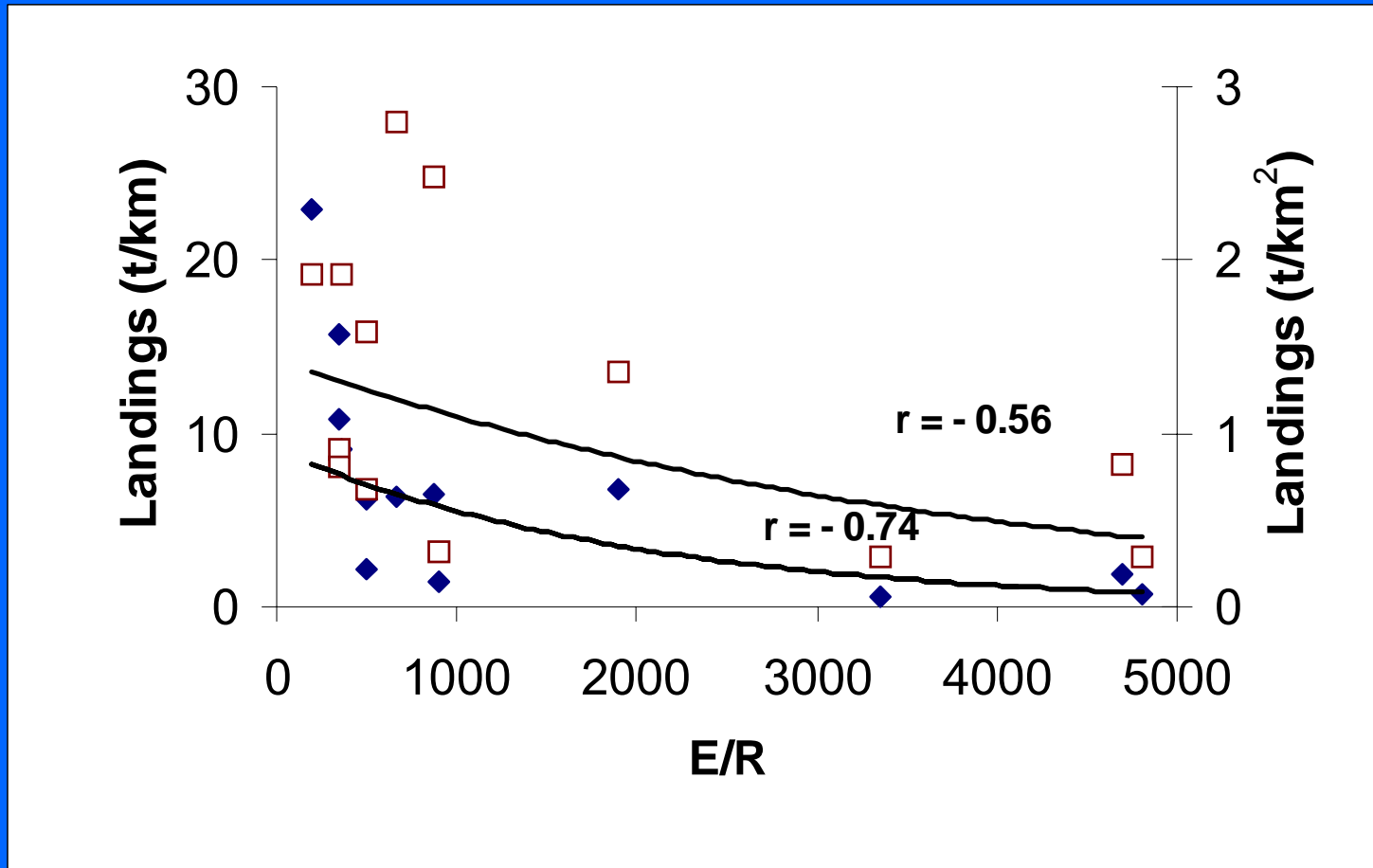
# Strengths of FRCC plan and DFO implementation

- E/R model provided a framework for comparing different Lobster Fishing Areas
- Got industry thinking; demonstrated that sky does not fall when regulations change
- Provided extra “incentive” for areas where changes were being considered
- LPA approach neutral
  - Other than Gulf of Maine little interaction between LFAs within LPAs
  - In Gulf of Maine regulation changes the same

# Weaknesses of FRCC plan and DFO implementation

- E/R turned out to be a hard sell to industry
- Areas with high landings per km<sup>2</sup> (and likely highest egg production) had lowest E/R

# E/R decreases with increases in landings/unit area



From R.J. Miller. Fig. 4. Landings (open squares for t/km<sup>2</sup> of fishing ground and solid diamonds for t/km of shore), averaged over the years 1994-97, versus eggs per recruit (E/R) for 13 fishing areas.

# Weaknesses of FRCC plan and DFO implementation (cont'd)

- E/R only changes in response to changes in  $F$ , size at maturity, growth, natural mortality
- Does not reflect what fishermen see - changes in abundance of legal sizes, recruitment or berried females i.e. changes in egg production per stock
- Areas with highest E/R had greatest difficulty meeting doubling target (e.g. LFAs 30, 41)

"One size does not fit all"

# Status of Lobster Fisheries

# Status of fishery and major management measures

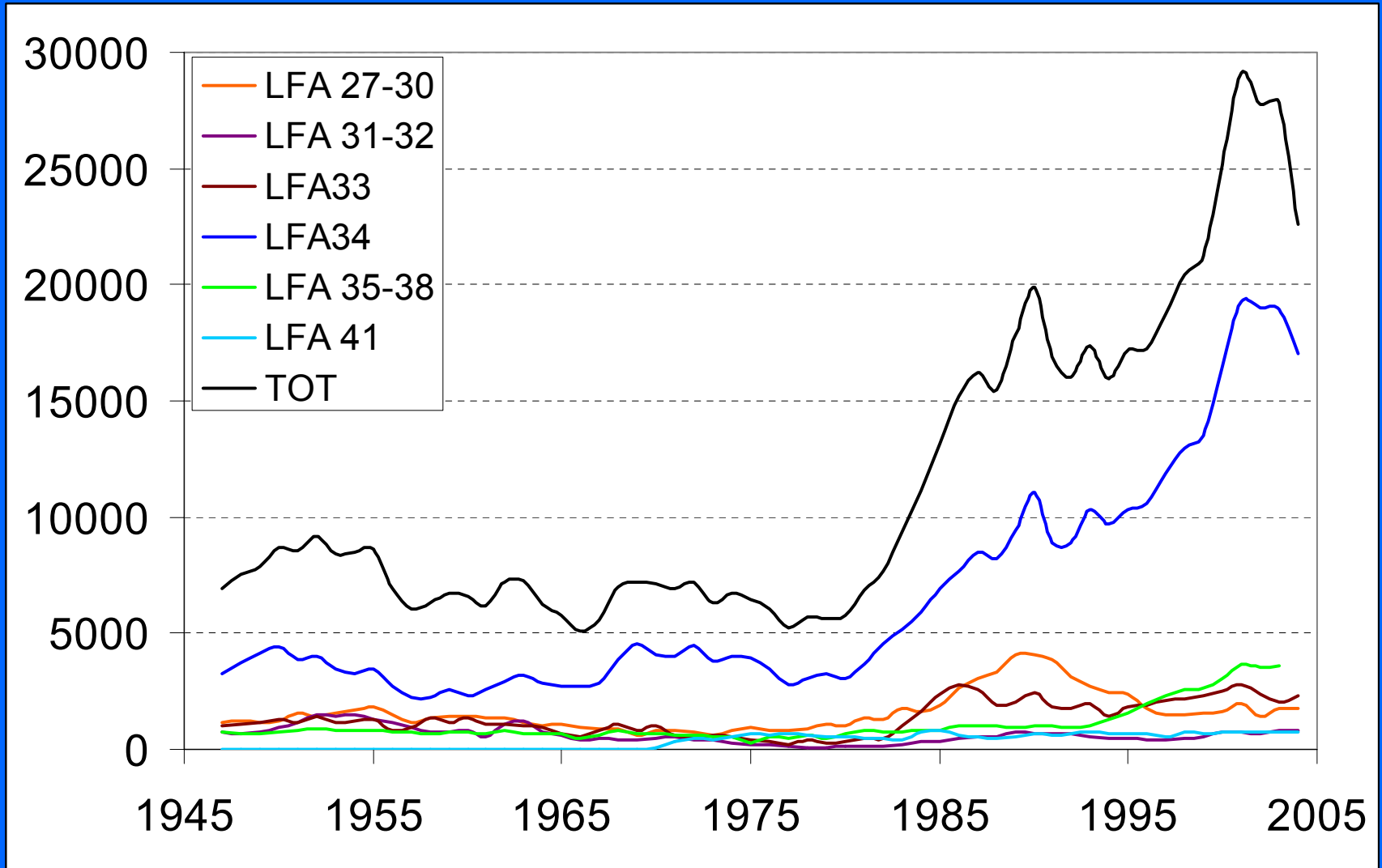
Status for most LFAs reviewed in last two years

- LFAs 27-30 – 2004
- LFAs 31-32 – 2004
- LFA 33 – 2004
- LFA 34 – 2006
- LFAs 35-38 – 2001
- LFA 41 - 2000
  
- Recent assessments have focussed on Indicators

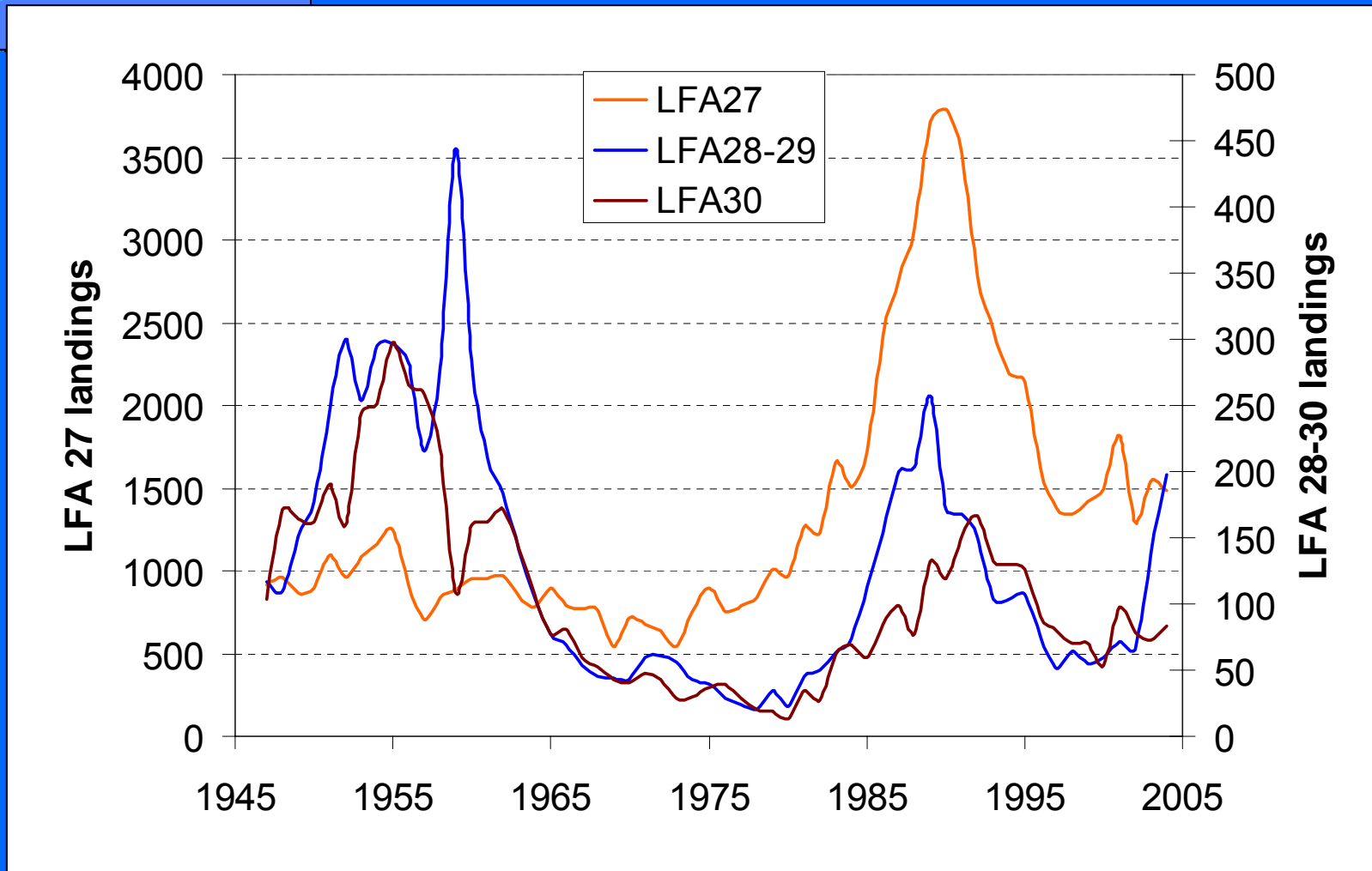
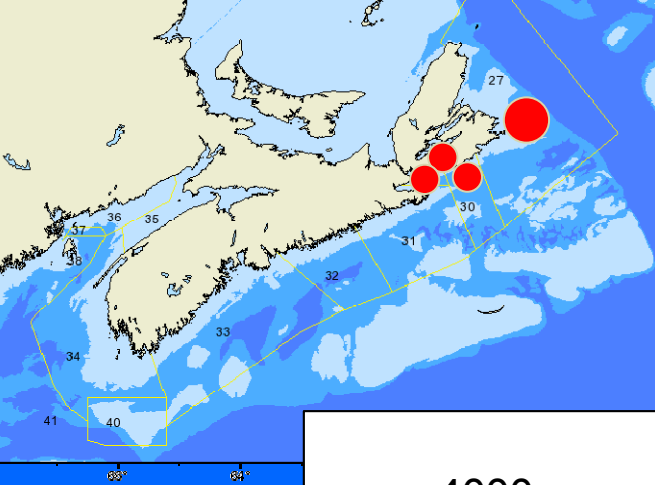
# Types of Indicators

- Abundance
- Fishing pressure
- Production
- Ecosystem

# Lobster Landings – Maritimes Region



# Eastern Cape Breton – LFAs 27-30



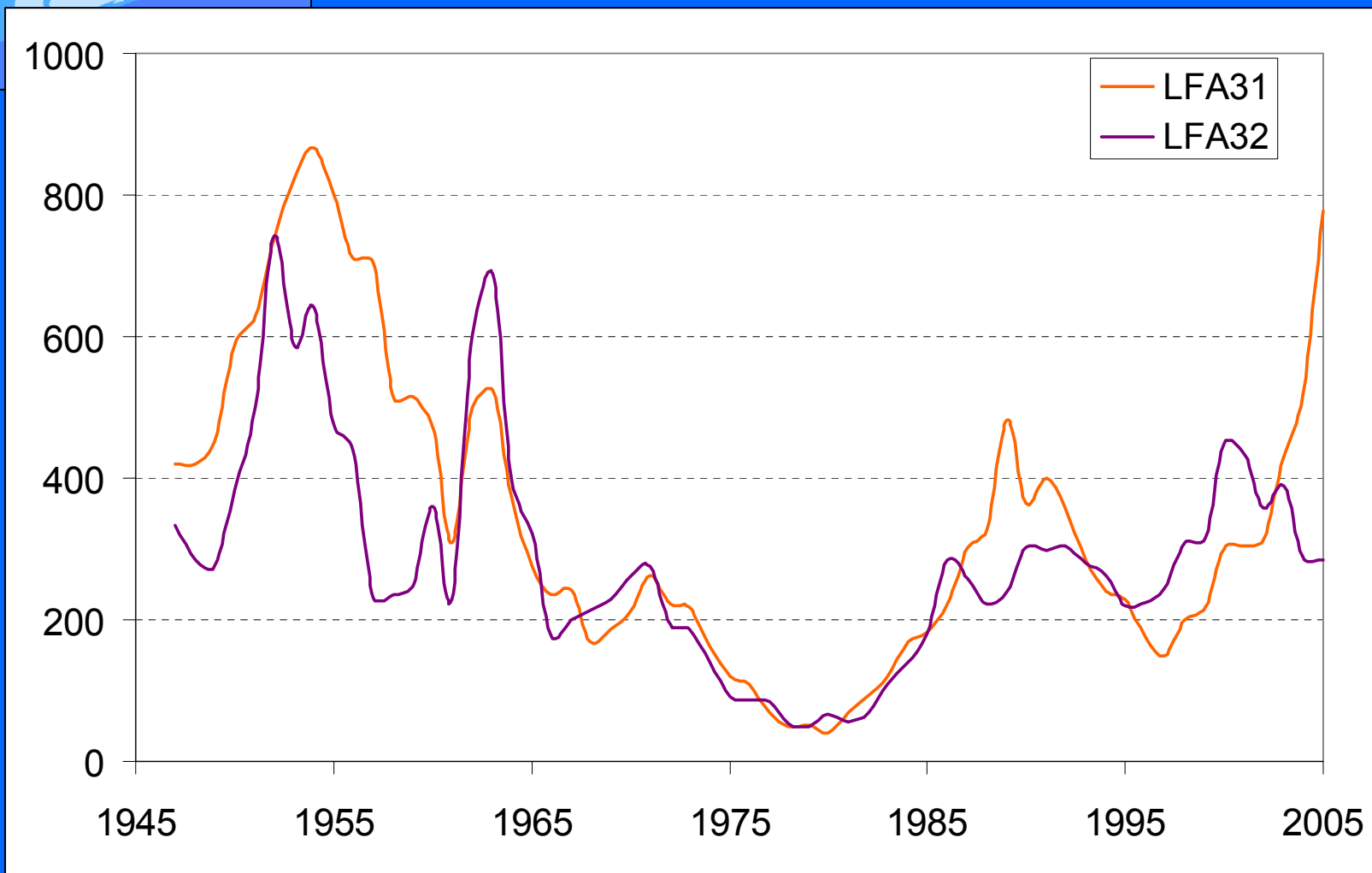
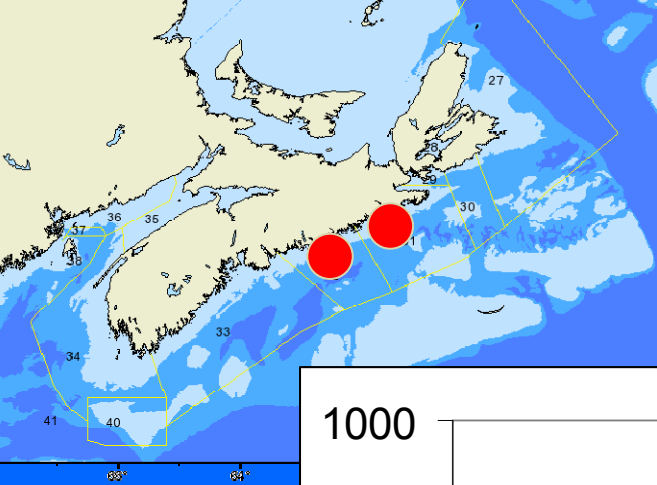
# LFAs 27-30

- **Management changes 1998 through 2002**
  - LFA 27 –MLS increase from 70 to 76 mm CL
  - LFA 28-29 - MLS increase from 81-84 mm CL; Max hoop size of 153 mm; trap limit reduced to 250 from 275; Return of notched females
  - LFA 30 – MLS increase from 81-82.5 mm; Female max size of 135 mm CL; Return of notched females
- With the management changes, E/R doubled in LFA 27 and increased by a lesser amount in LFAs 28-30
- Landings in LFAs 27, 29 and 30 were higher in 2004 than in 1997 (the year before management changes were introduced).
- Coincident with the increase in MLS in LFA 27, there are improvements in indicators for egg-bearing females and market lobsters in the north of LFA 27.

# LFA 27-30 cont'd

- Estimated exploitation rates in much of LFA 27 continue to be high.
- Stock improvements in LFAs 29 and 30 resulting from the management measures were not detectable by the indicators.
- In LFA 29 catch rates of several size groups increased substantially in 2003. The source of the increase is unclear with the data currently available.

# Eastern Shore – LFAs 31-32



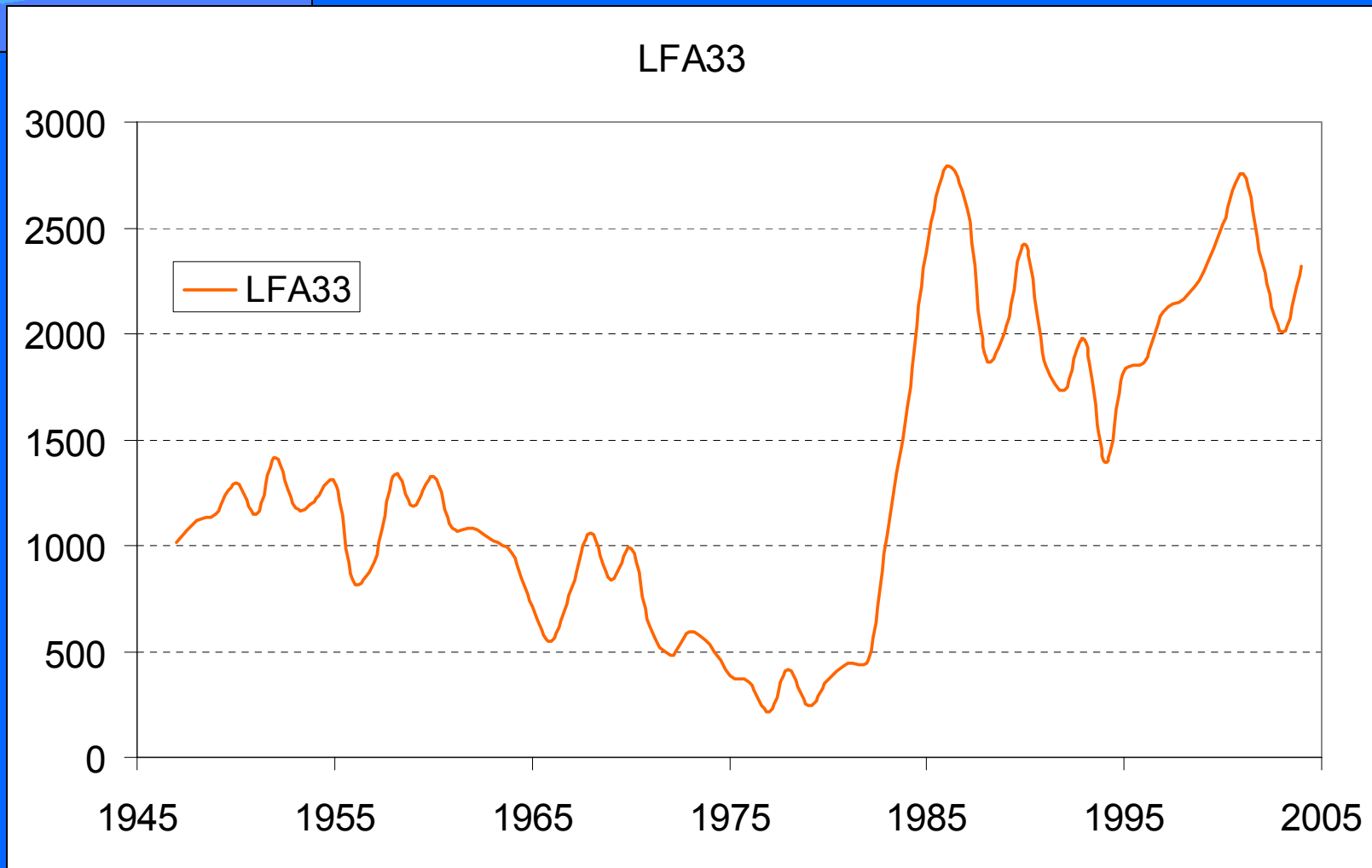
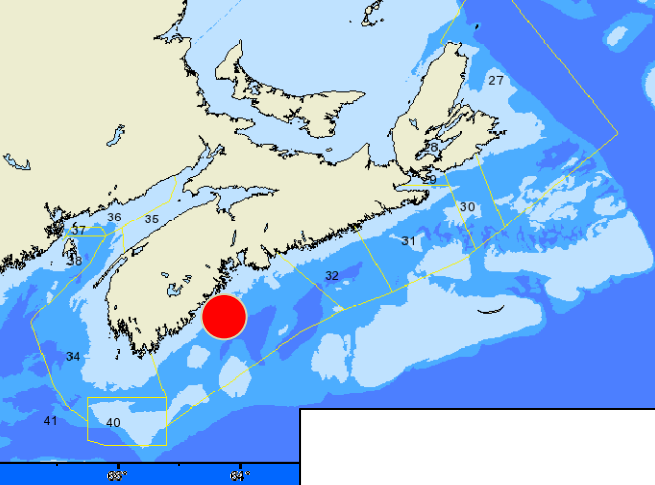
# LFA 31-32

- **Management changes** 1998 through 2001
  - LFAs 32 & 31B - MLS increased 1.5 mm & each license holder v-notches & returns 50 kg of large non-ovig females that cannot be retained if recaptured
  - LFA 31A MLS increased 5 mm from 81-86 mm CL and non-ovigerous (window) females 114-124 mm CL are not retained. *Recently MLS reduced to 84 mm CL*
- Increases in E/R from changes:
  - LFA 31A – 34%
  - LFA 31B – 21%
  - LFA 32 – 34%
- There was no change in ovigerous (berried) females per trap haul.

# LFA 31-32 cont'd

- Stock status indicators of catch per trap haul, landings, and pre-recruits were higher in most areas. Exploitation, as measured by percent of catch in the first molt group, was unchanged.
- Catch rates of legals, pre-recruits, ovigerous, and v-notched taken from volunteer fishermen's log records were especially useful indicators
- Out-of-season larval and pre-recruit surveys may provide early indicators of stock response to changes in fishing effort, environment, or stock management.

# LFA 33



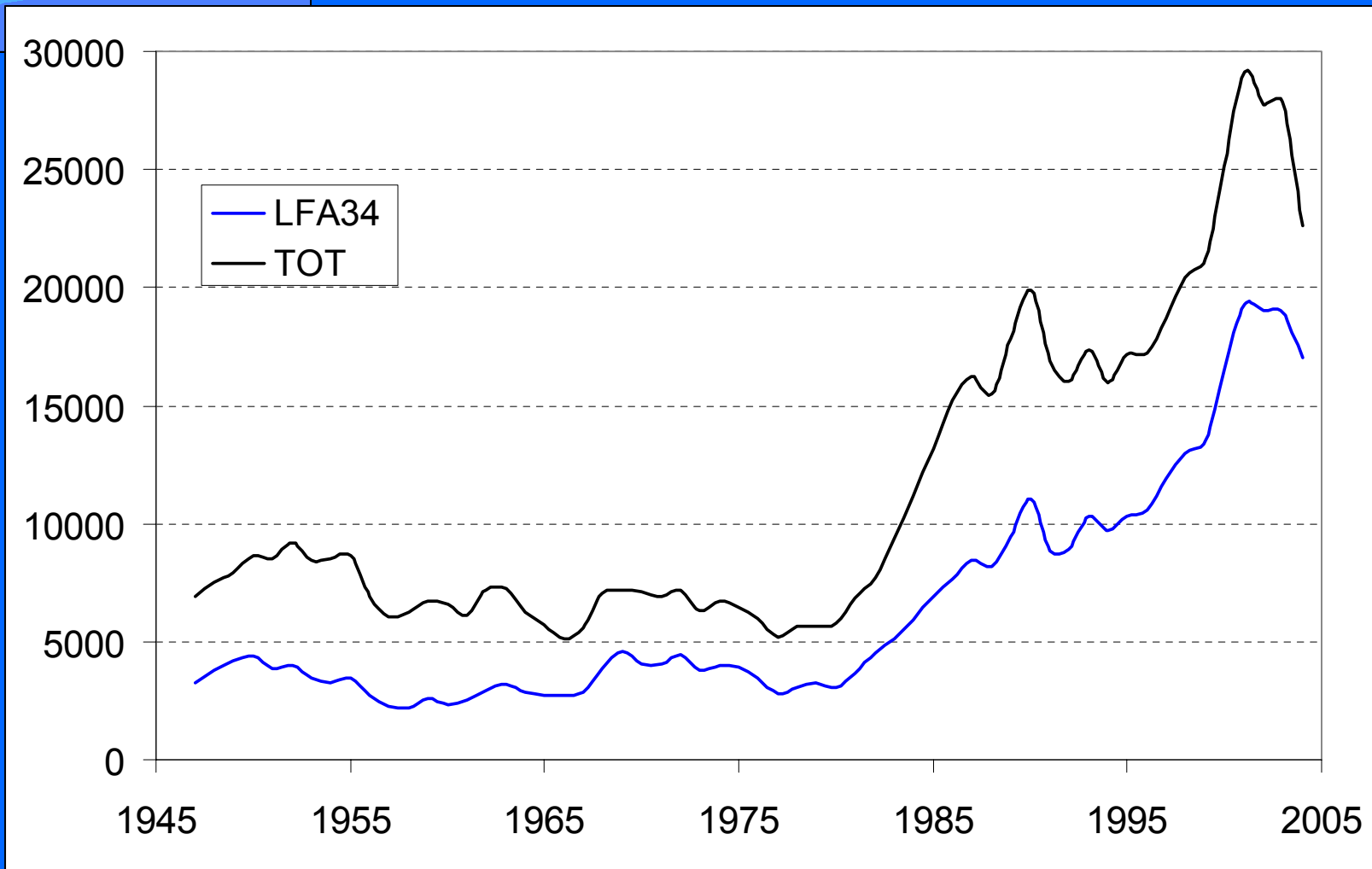
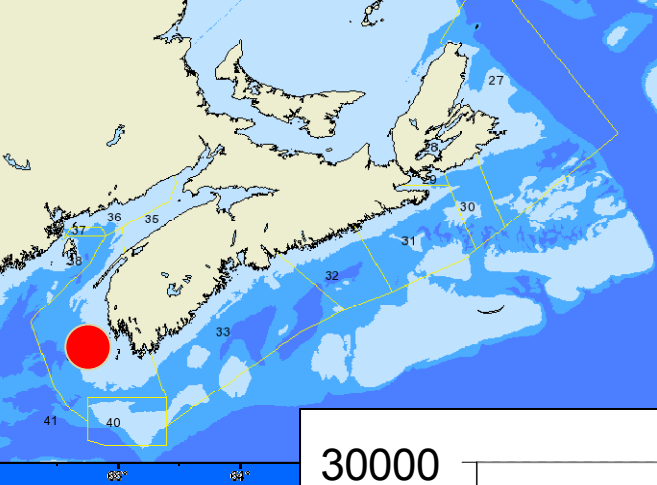
# LFA 33

- Management changes 1998 through 2002
  - MLS increased from 81 to 82.5 mm CL; Voluntary v-notching
  - release of lobsters missing claws (culls)
- Landings since the early 1980's have been higher than the previous 30 years.
- Legal sized lobster indicators were primarily positive or exhibited no change during the years of the management plan.
- Pre-recruit (sub-legal sized) lobster indicators exhibited no overall change or were negative during the years of the management plan.

# LFA 33 cont'd

- Berried female (larger than 50% size-at-maturity, >100mm) indicators were positive during the years of the management plan.
- Exploitation rate indicators (Extended Exploitation Rate) *were positive* during the years of the management plan.

# LFA 34



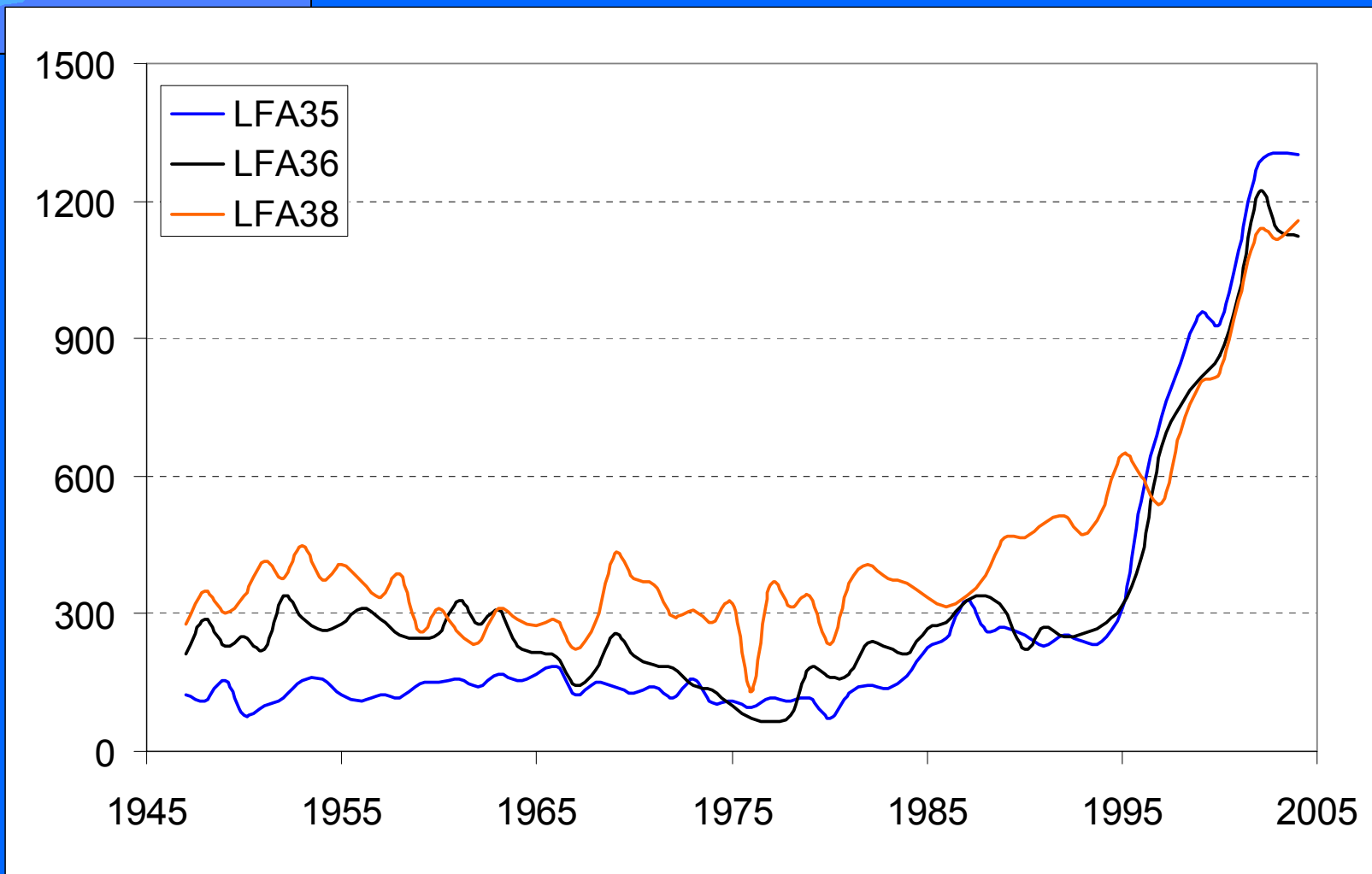
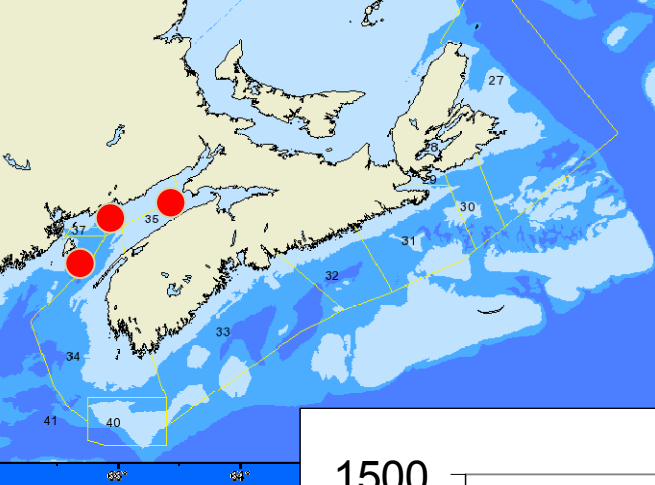
# LFA 34

- **Management changes** 1998 through 2002
  - MLS increased from 81 to 82.5 mm CL; Voluntary v-notching
  - release of lobsters missing claws (culls)
  - \*mandatory fishing logs with effort and location
- **Abundance indicators** for legal sizes which include landings, catch rate and scallop survey data are primarily positive
  - Landings in LFA 34 as a whole continue to be above long-term means but peaked in the 2001-02 season
  - Landings in sub-areas of LFA 34 generally followed the pattern of the LFA as a whole. Exception: a traditional nearshore ground (Lobster Bay) which has declined 20 % from the reference period (1998/1999 to 1999/2000)
  - Catch rates based on logbooks and on Fisherman Scientist Research Society (FSRS) data trended similarly to landings

# LFA 34 cont'd

- **Fishing pressure indicators** showed increased pressure or no change.
  - A shift in effort away from traditional nearshore grounds
  - The increase in fishing pressure in midshore and offshore raises a conservation concern because these grounds have historically supported larger lobsters.
  - Relative to the reference period the stock is still fished at high levels with estimates for exploitation in inshore areas  $> 70\%$
- **Production indicators** showed no changes or were positive in relation to the reference period
  - Pre-recruit abundance in a nearshore portion of LFA 34 continues to be high but has trended downwards recently
  - Limited indicators for berried females show no change
- An **ecosystem indicator**, mean ocean bottom temperatures fell by about  $2.5^{\circ}\text{C}$  from 1999/2000 to 2003/2004 and recovered by  $1^{\circ}\text{C}$  in 2004/2005

# LFA 35-38



# LFA 35-38

## Management changes 1998 through 2002

- MLS increased from 81 to 82.5 mm CL; Voluntary v-notching
- release of lobsters missing claws (culls) (*This regulation was removed in LFA 36 and 38 during 2005*)
- mandatory fishing logs with effort and location (*not entered by Statistics Division until 2006*)

## Abundance Indicators positive

- Bay of Fundy landing have been increasing since 1994-95
- Landings have levelled off at an all time high (112 years) during the last three seasons (2001-02 -2003-04).
- Lobster settlement index in LFA 36 indicates that settlement was low (below a 14 years average) in 2000, but very high in 2005 (6 \* mean).

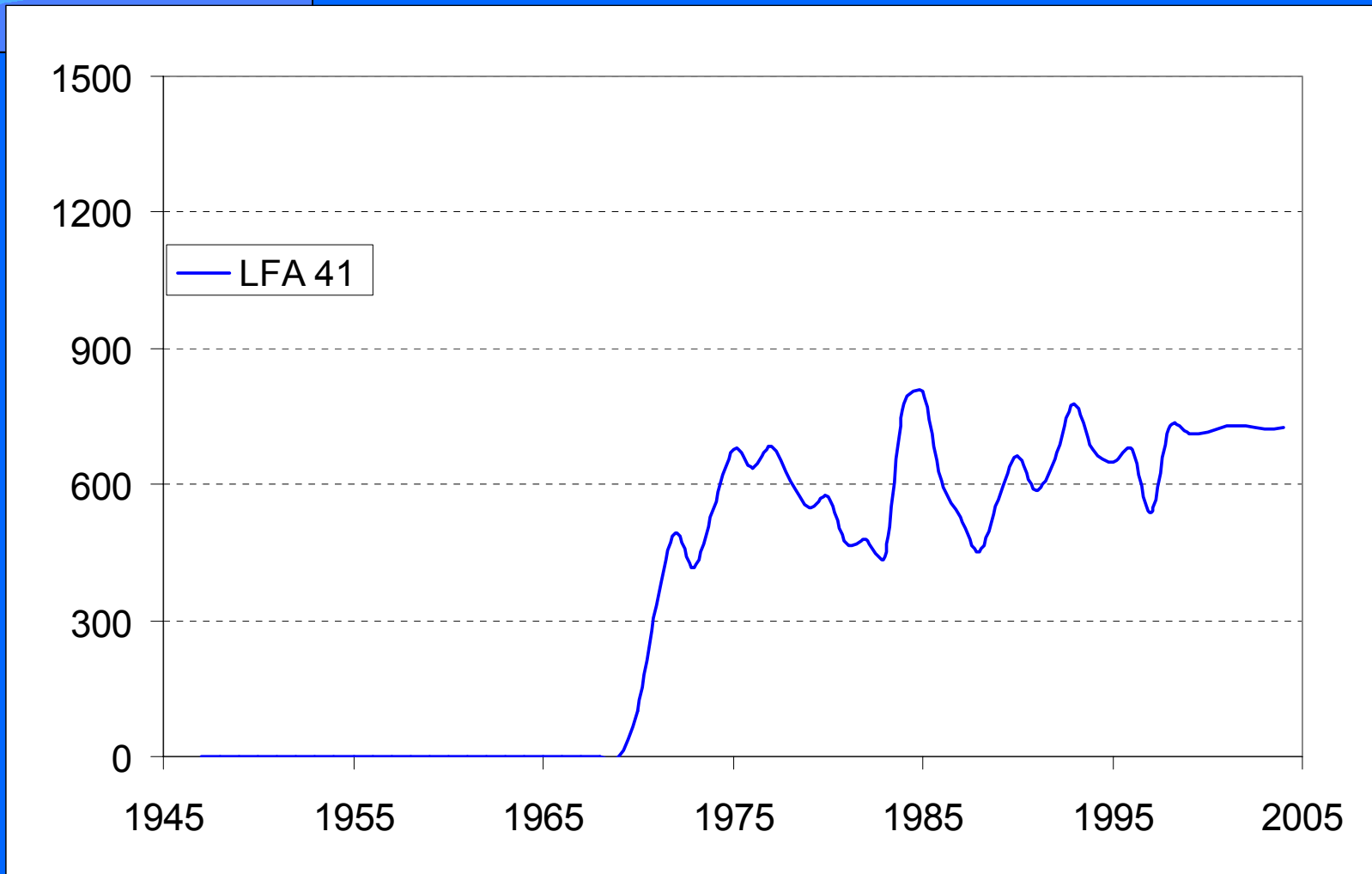
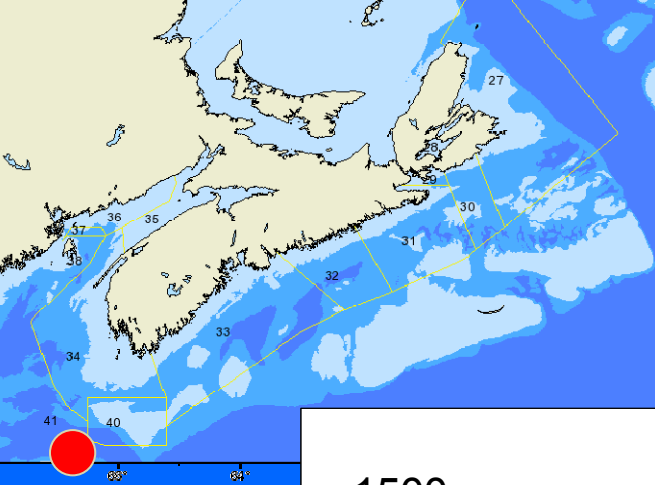
# LFA 35-38

## Abundance Indicators (cont'd)

LFA 38 female density index (Flagg Cove 17 year diver-based survey) :

Female densities peaked in 2002 and remained high in 2003 and 2004. In 2005 the density of female declined by approximately 50% compared to 2004, and was similar to density levels obtained in the early 1990's

# LFA 41 (Offshore)



# LFA 41

- **Landings** have remained stable at the TAC level (presently 720 t). Under TAC since 1976
- **Management changes** 1998 through 2002:
  - E/R already high---Adopted the conservation measures of LFA 33-34 but no additional conservation measures
  - MLS increased from 81 to 82.5 mm CL; Returned notched females.
  - Release of lobsters missing claws (culls). This has been a long-term practice in the fishery based on economics, (culls are worth less per pound and catch is limited by TAC)
- **Size structure** has changed little over the last 25 years and is dominated by mature sizes
  - Median size in catch is well above the size at 50% maturity (~ 96 mm CL); most animals reproduce at least once with many reproducing 2 or more times

# Uncertainties in Stock Status

- Effective effort (vessel size, navigation aids, traps etc)
- Fishing strategy – targeting certain sizes?
- Size at maturity
- Seasonal changes in catchability

# Overall – Maritimes Region LFAs 27-34

- **E/R** – current estimates would be unchanged from 2001 estimates
- **Management changes** – Some positives demonstrated in stock changes
- **Abundance indicators** - generally positive or no change in recent years
- **Fishing pressure** –
  - Remains high in most areas
  - Exploitation rate changes generally not detected
  - Not tracking increases in effective effort (boat size, navigation, traps etc.)

# Ecosystem effects of lobster fishery

- Gear damage to bottom – unevaluated but thought to be small
- Bycatch: can be substantial; poorly tracked
  - Rock Crab & sculpin retained & used as bait
- Discard mortality of all species thought to be low but not evaluated
  - Cusk – Some bycatch studies in LFA 34 initiated
  - Cod?
- Entanglement – marine mammals

# Potential Roles for Industry

1. Data collection – Improved substantially since 1998

# More data from industry since 1998

- Logs in LFA 34 (since 1998)
- Logs in LFAs 27-33 (new in 2005 season)
- Logs in LFAs 35-38?
- FSRS project
- Industry generated surveys (e.g. Guysborough County, Bay of Fundy in 2002-03)

# *Fishermen-Designed Traps Used to Study Recruitment*

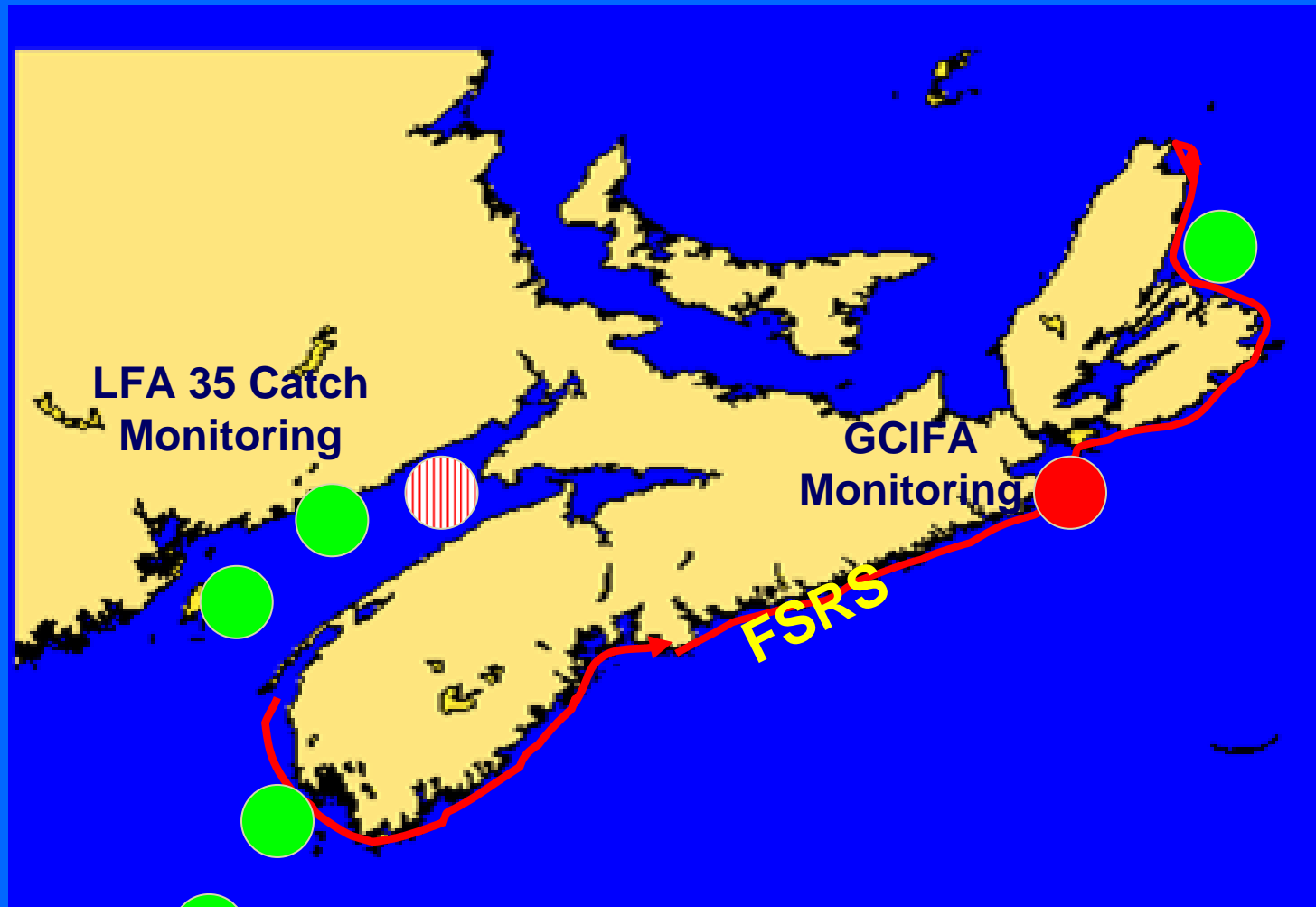
**Fishermen and  
Scientists  
Research Society  
(FSRS)**



**LFA 35  
Juvenile  
Trap Design**



# *Sampling During Fishing Provides Indicators for All Sizes*



Offshore Sea  
samples



# Potential Roles for Industry cont'd

1. Data collection – Improved substantially since 1998
2. Feedback on data analysis & interpretation (e.g. LFA 34 Science committee)
3. Development of management plans
  - Setting of Reference Points – Targets & Limits
  - Measures to achieve Targets
  - Decision Rules should Limits be exceeded or Targets be met