Spatial patterns in the fall NEFSC survey for Eastern Georges Bank cod, Eastern Georges Bank haddock and Georges Bank yellowtail flounder

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Objective

- Address Term of Reference “US Fall Survey delays – potential implications for 2018 assessments”
- Spatial distribution analysis for EGB cod, EGB haddock and GB yellowtail flounder based on fall Northeast Fisheries Science Center (NEFSC) bottom trawl survey data, 1963–2017

Outline

- Methods
- Results
  - EGB cod
  - EGB haddock
  - GB yellowtail flounder
- Conclusions

Methods

- Spatial distribution
  - Spatial summary statistics
  - Center of gravity (CG) is the bivariate mean location of the population
- Geostatistics (intrinsic)
  - Modeling correlation between observed (z) values in two (x, y) dimensional space

Methods

- Data preparation
  - Longitude and latitude for each trawl station were converted to Euclidean space (km)
  - Geographically referenced longitude and latitude are presented in CG maps as easting and northing

Methods

- Center of gravity (CG)

$$\mathrm{CG} = \frac{\sum_{i=1}^{n} x_i w_i z_i}{\sum_{i=1}^{n} w_i z_i}$$

  - x_i is location (X or Y)
  - w_i is area of influence
    - Useful for area occupancy indices
  - z_i is biomass

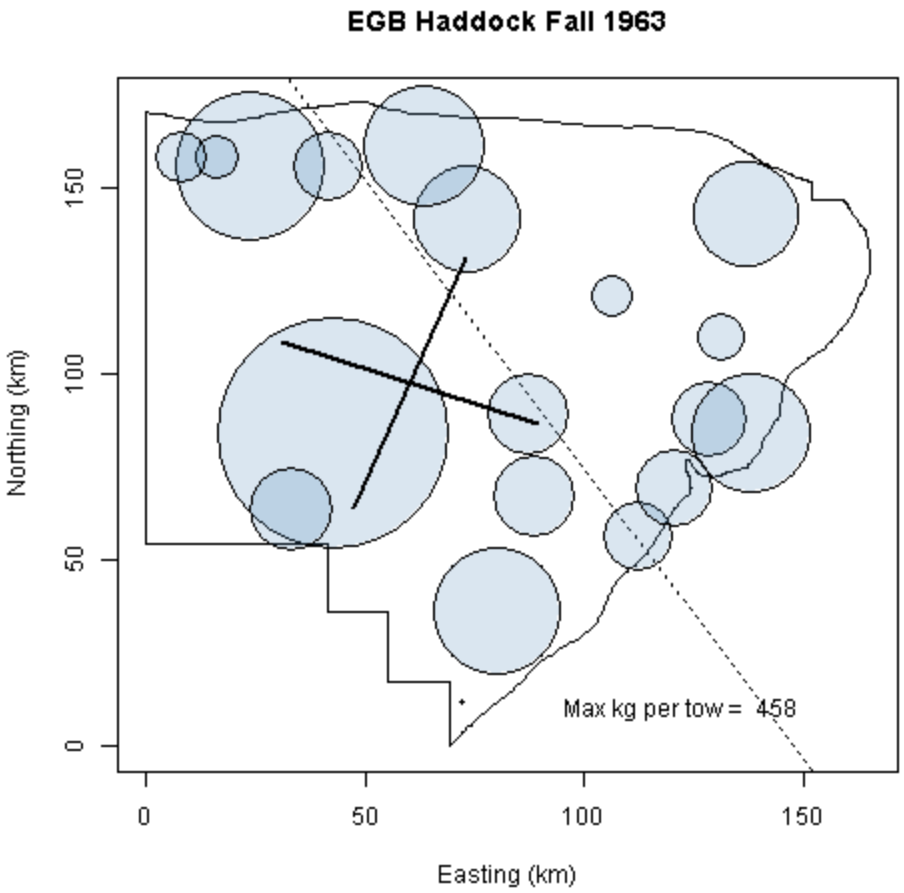
Methods

- Inertia (variance)

$$I = \frac{\sum_{i=1}^{n} (x_i - \mathrm{CG})^2 w_i z_i}{\sum_{i=1}^{n} w_i z_i}$$

  - Can be decomposed into two orthogonal axes describing the maximum and the minimum components of the inertia
  - Square root for a given axis gives the SD of the respective axis
  - Has units of km^2 so plotted on maps as SD

Methods


EGB Haddock Fall 1963
Northing (km)
Easting (km)
0
50
100
150
Max kg per tow = 458

Methods

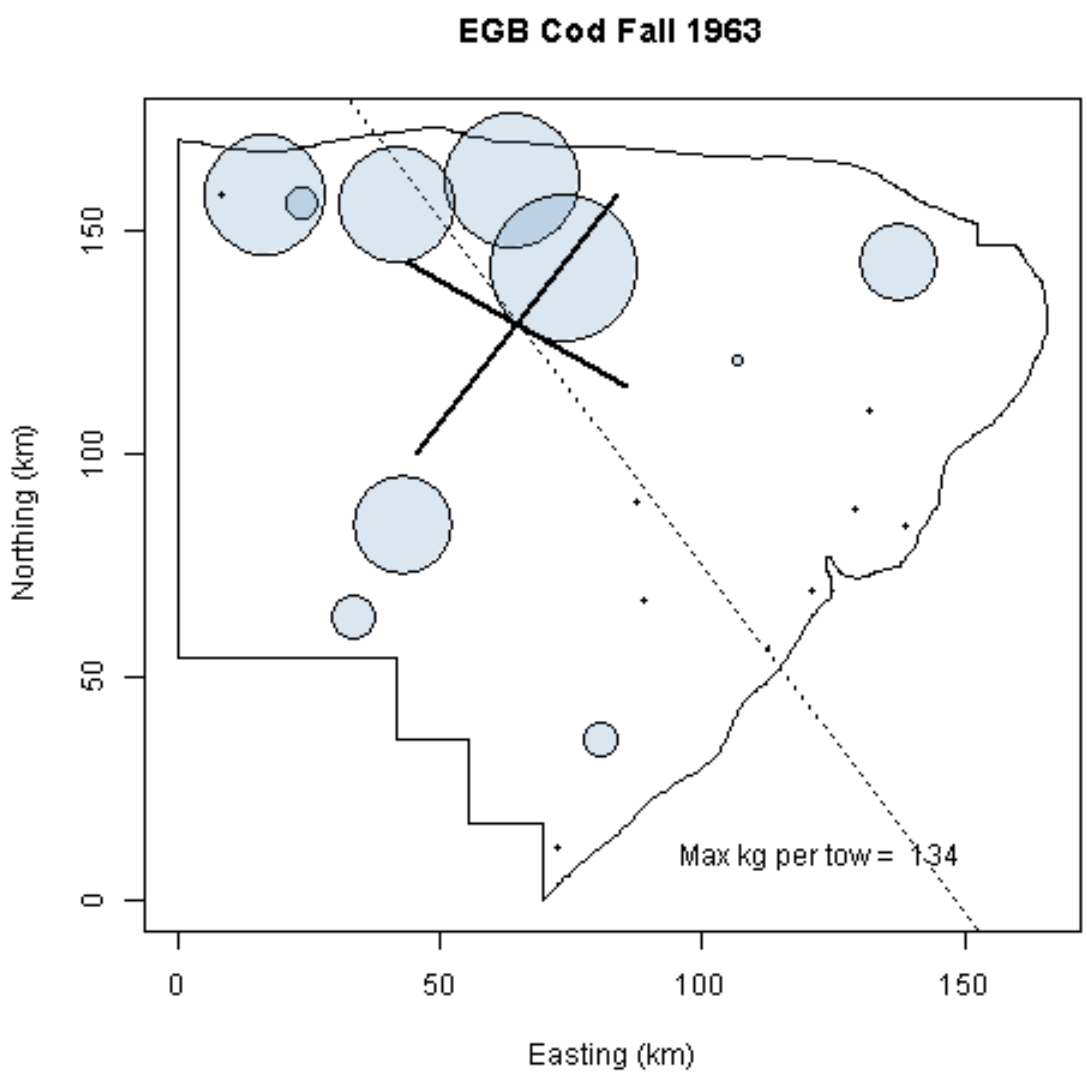
All Strata

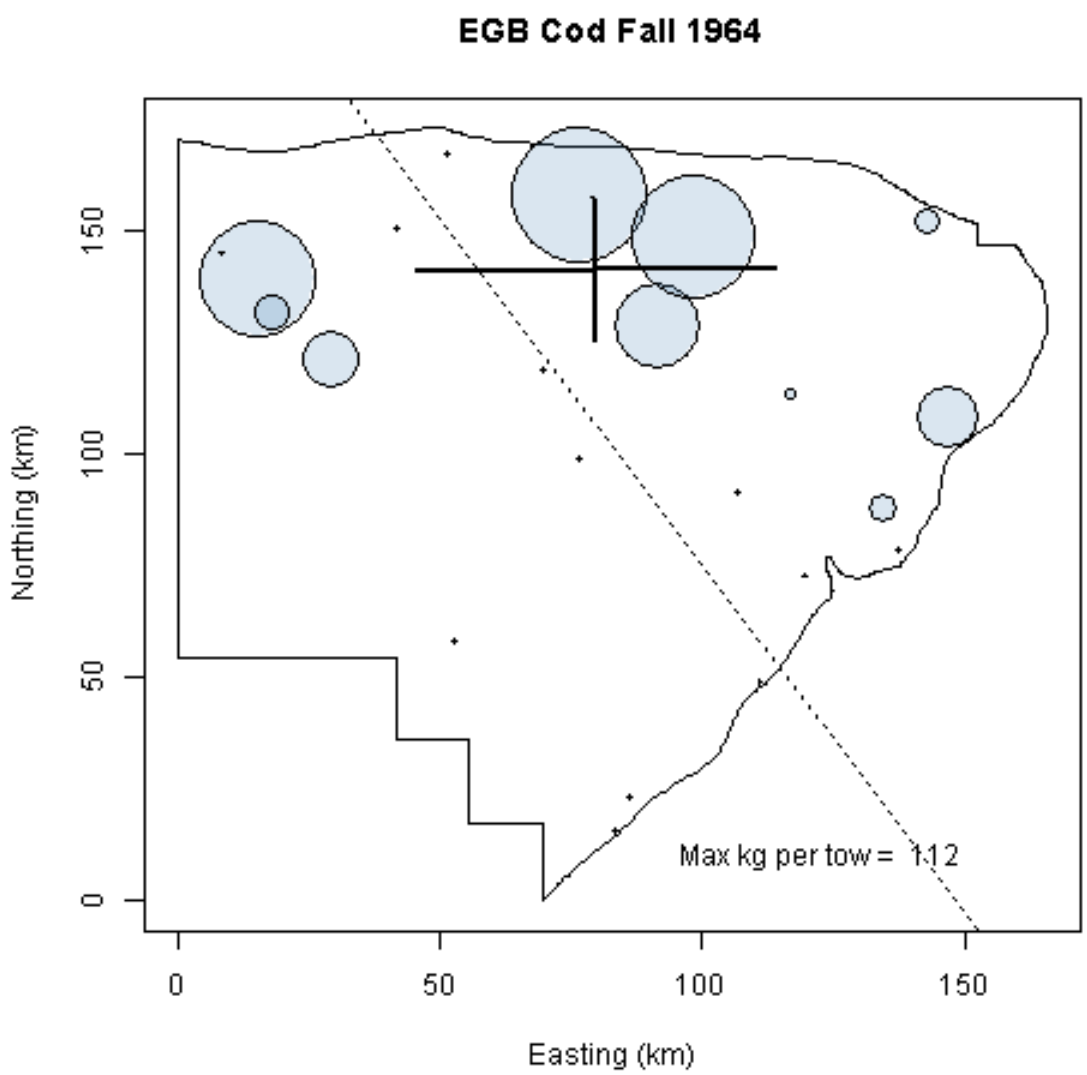
YEAR	STARTDATE	ENDDATE
2008	2-Sep-08	13-Nov-08
2009	8-Sep-09	18-Nov-09
2010	8-Sep-10	3-Dec-10
2011	7-Sep-11	14-Nov-11
2012	4-Sep-12	11-Nov-12
2013	3-Sep-13	19-Nov-13
2014	2-Sep-14	14-Nov-14
2015	1-Sep-15	13-Nov-15
2016	6-Sep-16	11-Nov-16
2017	10-Oct-17	18-Nov-17

TRAC Strata

YEAR	STARTDATE	ENDDATE
2008	2-Oct-08	14-Oct-08
2009	20-Oct-09	4-Nov-09
2010	19-Oct-10	1-Nov-10
2011	5-Oct-11	28-Oct-11
2012	3-Oct-12	21-Oct-12
2013	30-Sep-13	5-Nov-13
2014	10-Oct-14	6-Nov-14
2015	28-Sep-15	15-Oct-15
2016	12-Oct-16	21-Oct-16
2017	20-Oct-17	9-Nov-17

CG Maps: EGB Cod


EGB Cod Fall 1963
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 134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Northing (km)
Easting (km)
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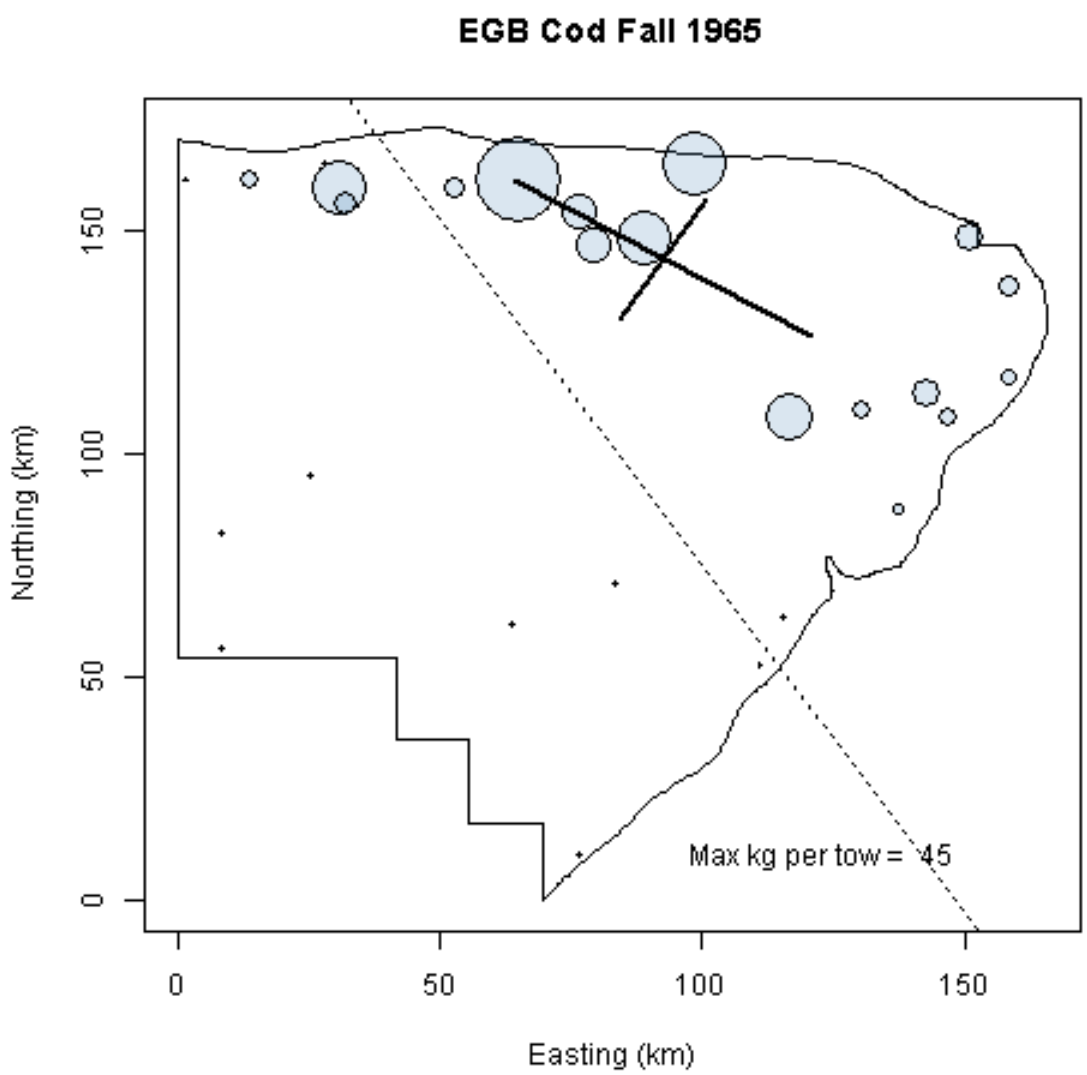
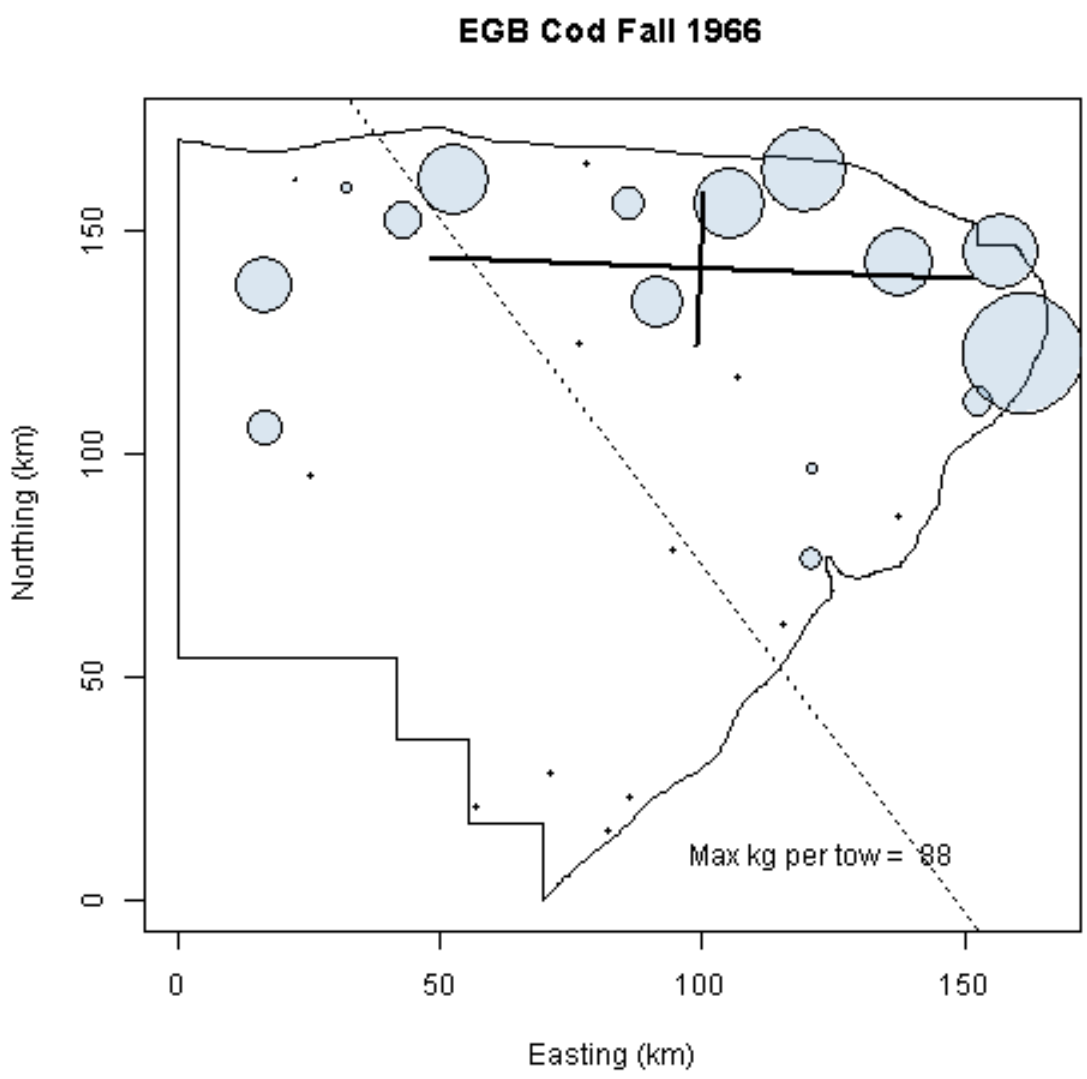
0
50
100
150
Max kg per tow = 1.12


EGB Cod Fall 1965
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 45


EGB Cod Fall 1966
Northing (km)
Easting (km)
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100
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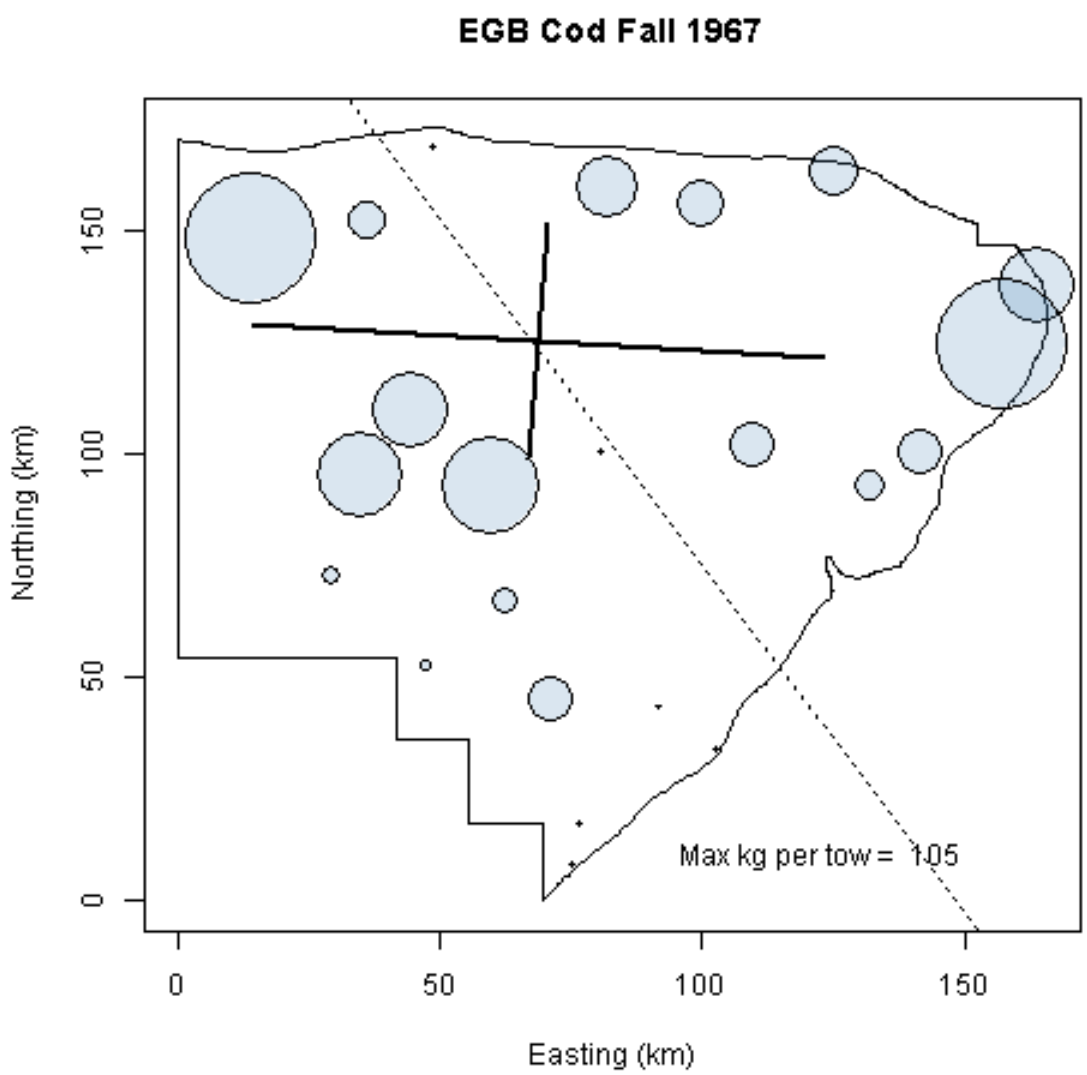
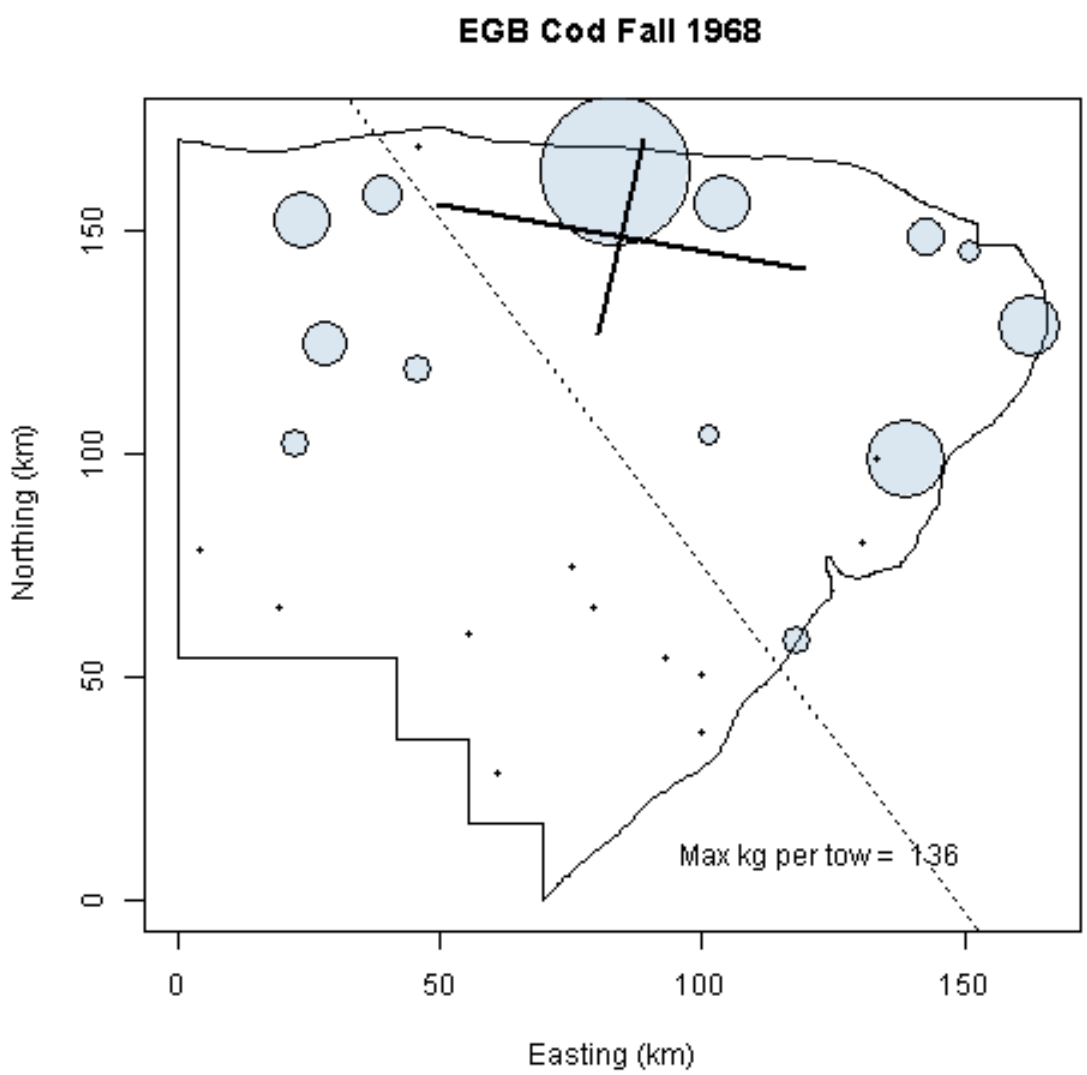
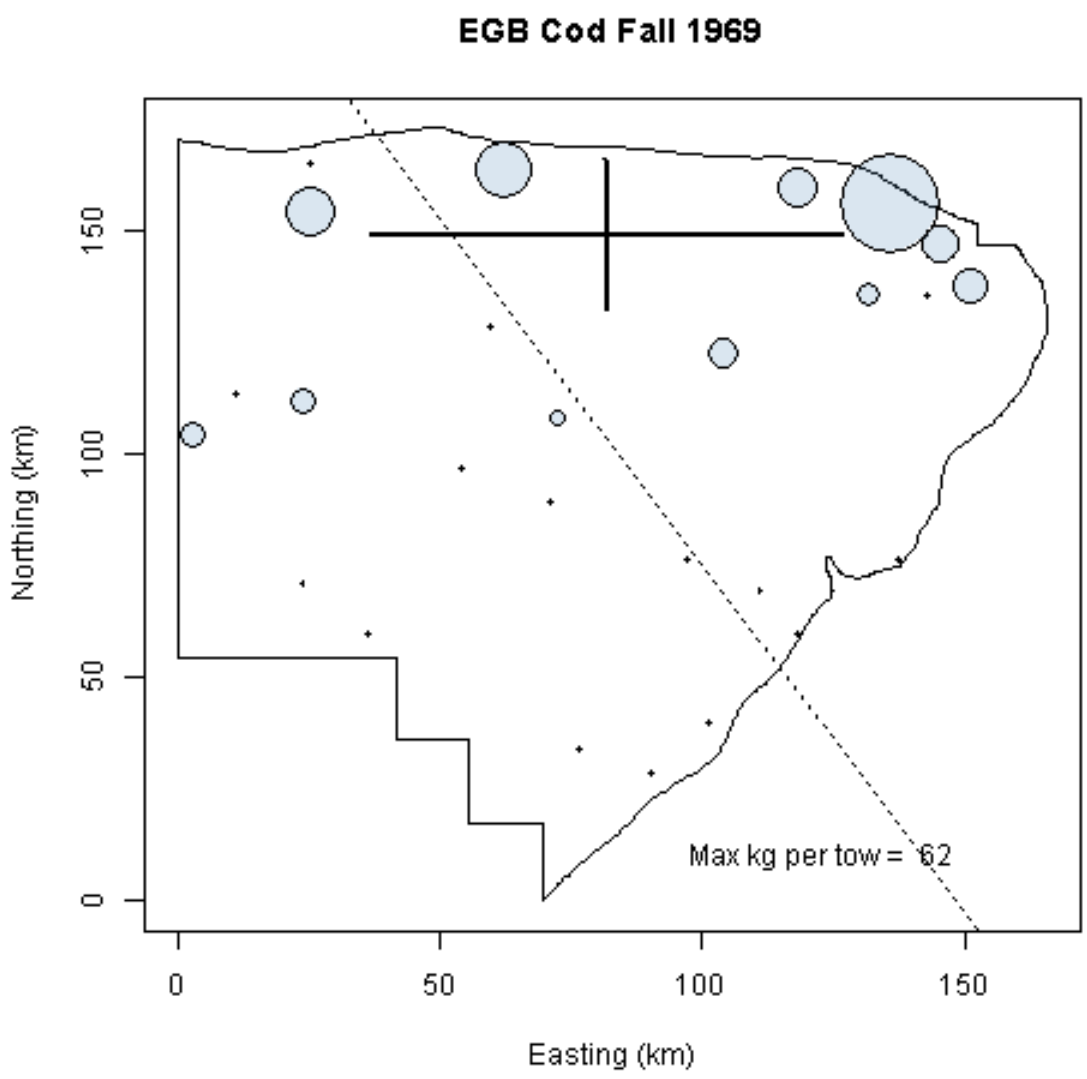
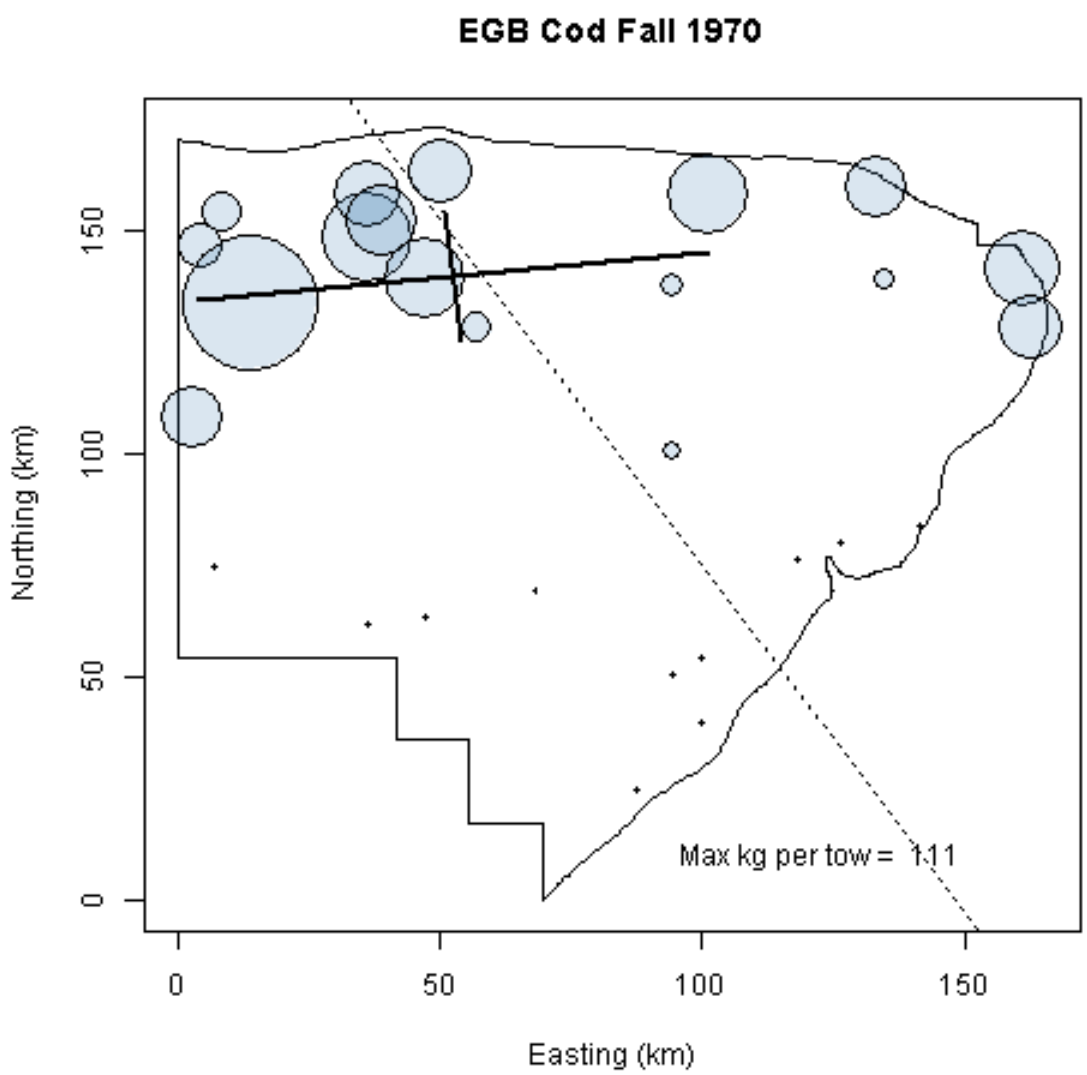
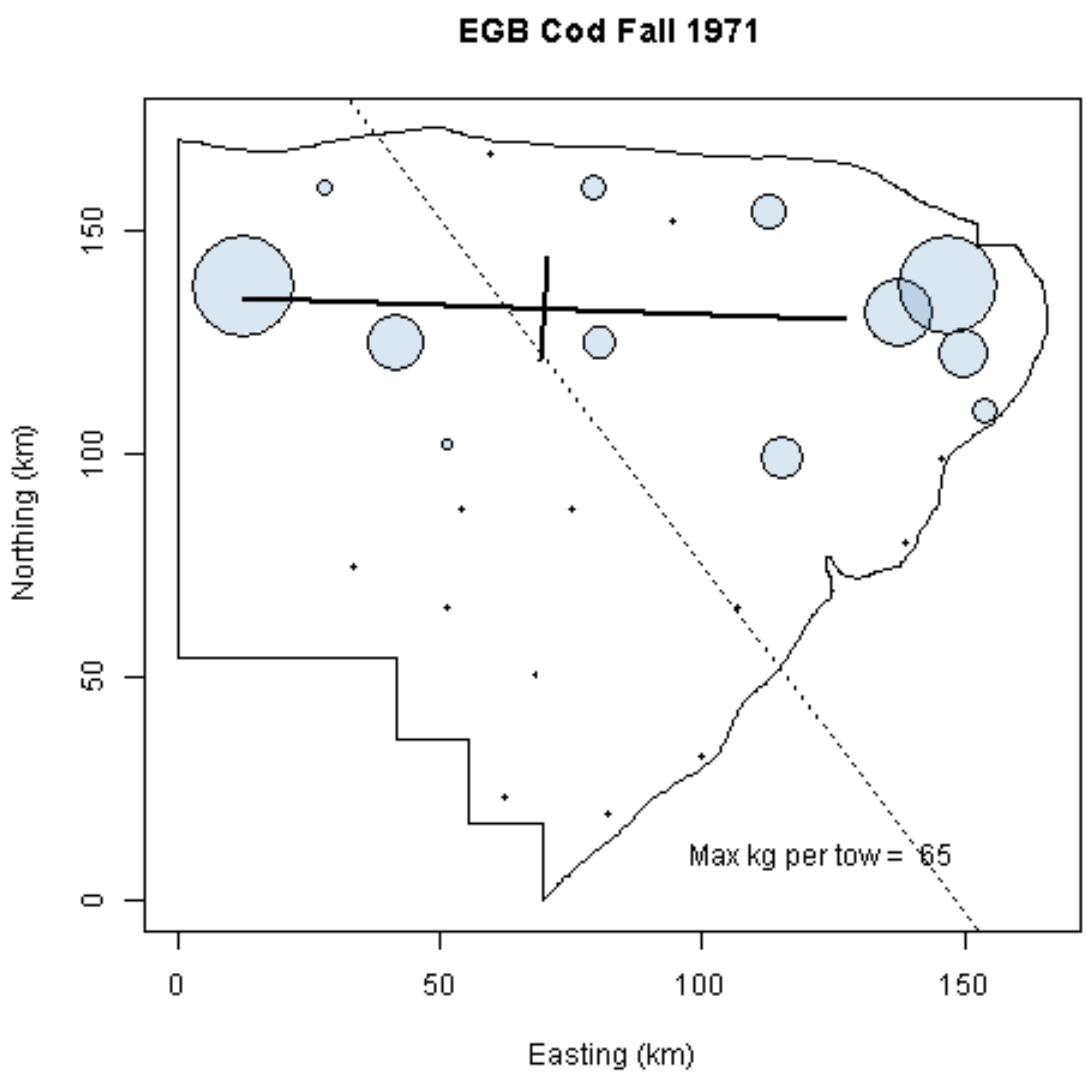
0
50
100
150
Max kg per tow = 88

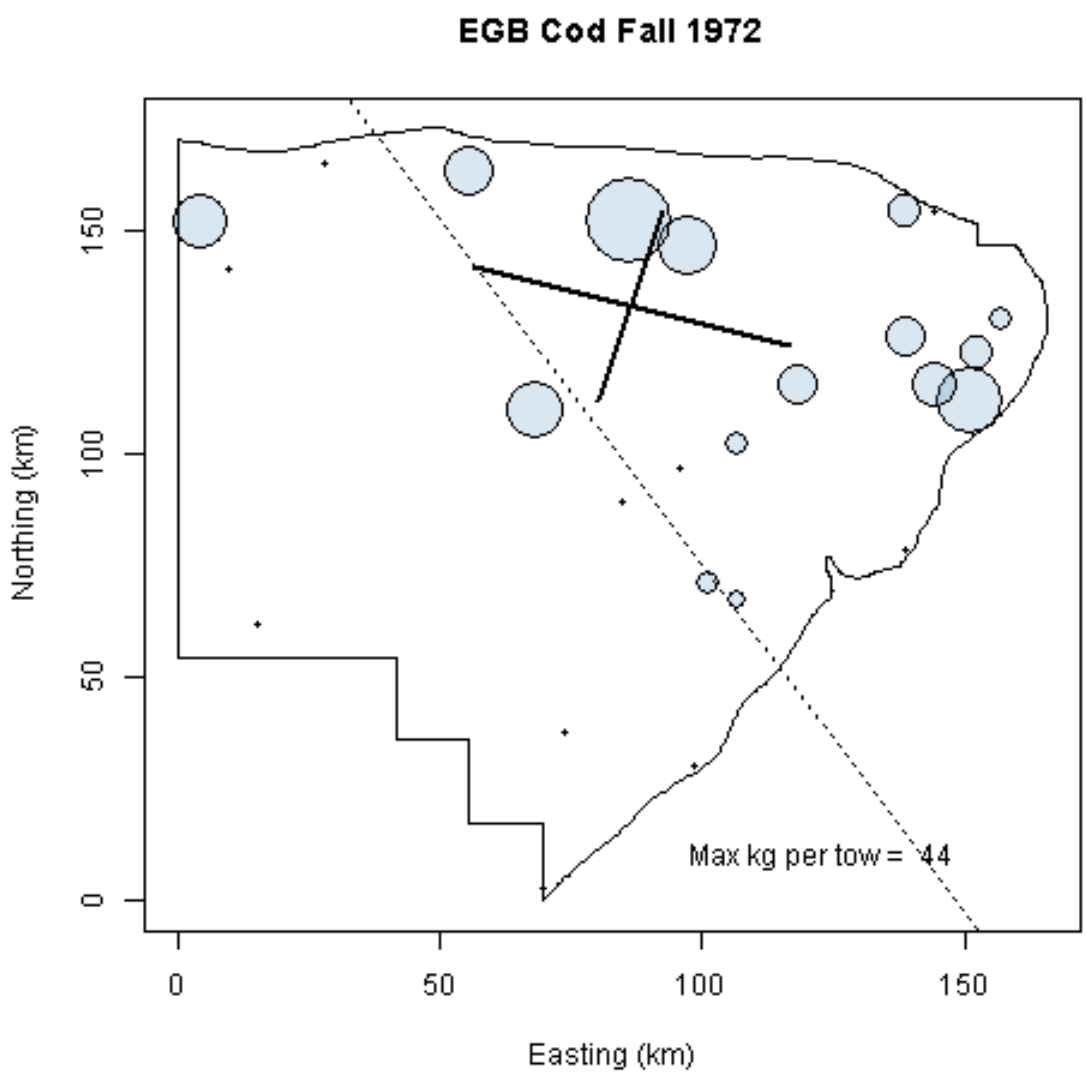

EGB Cod Fall 1967
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 105

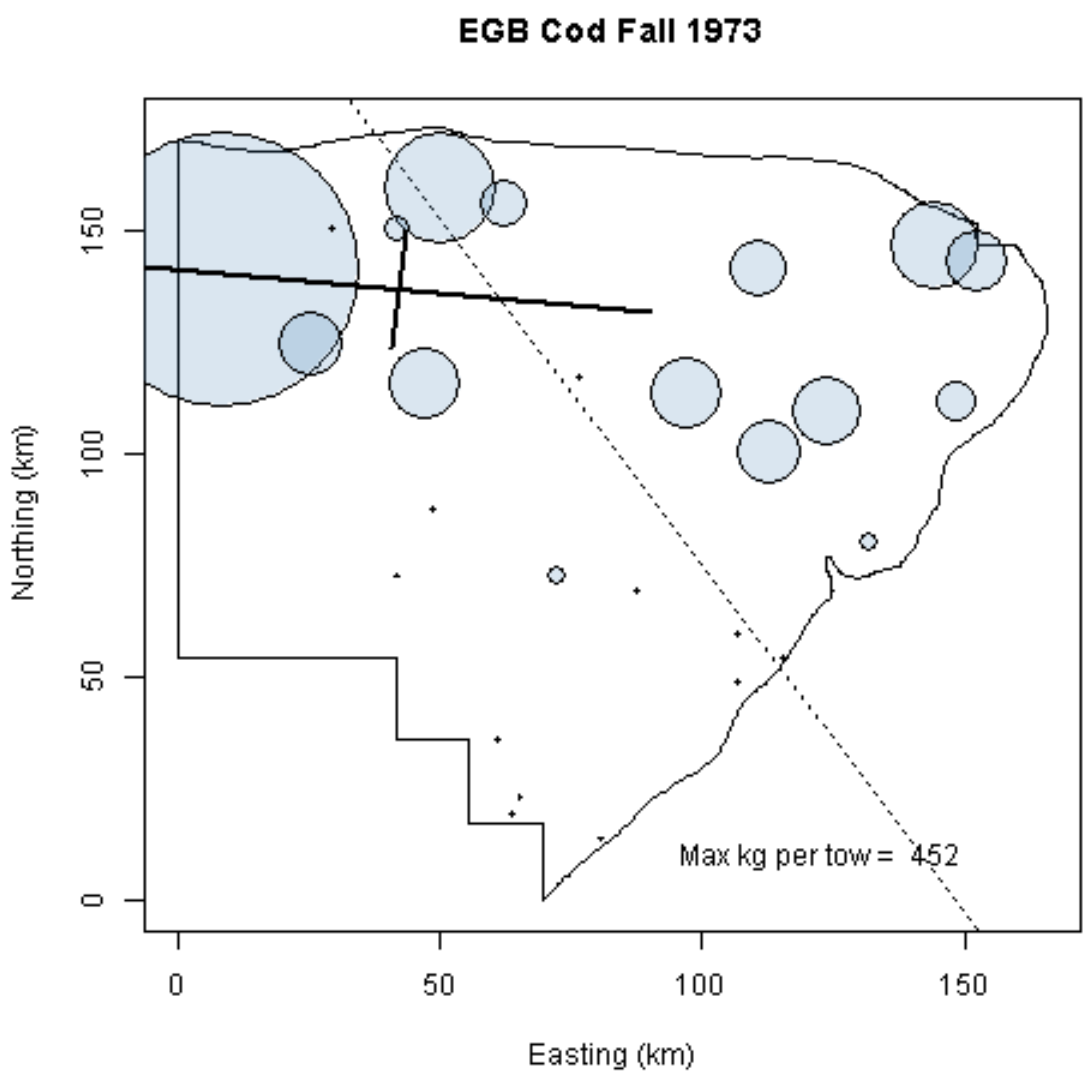

EGB Cod Fall 1968
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 136

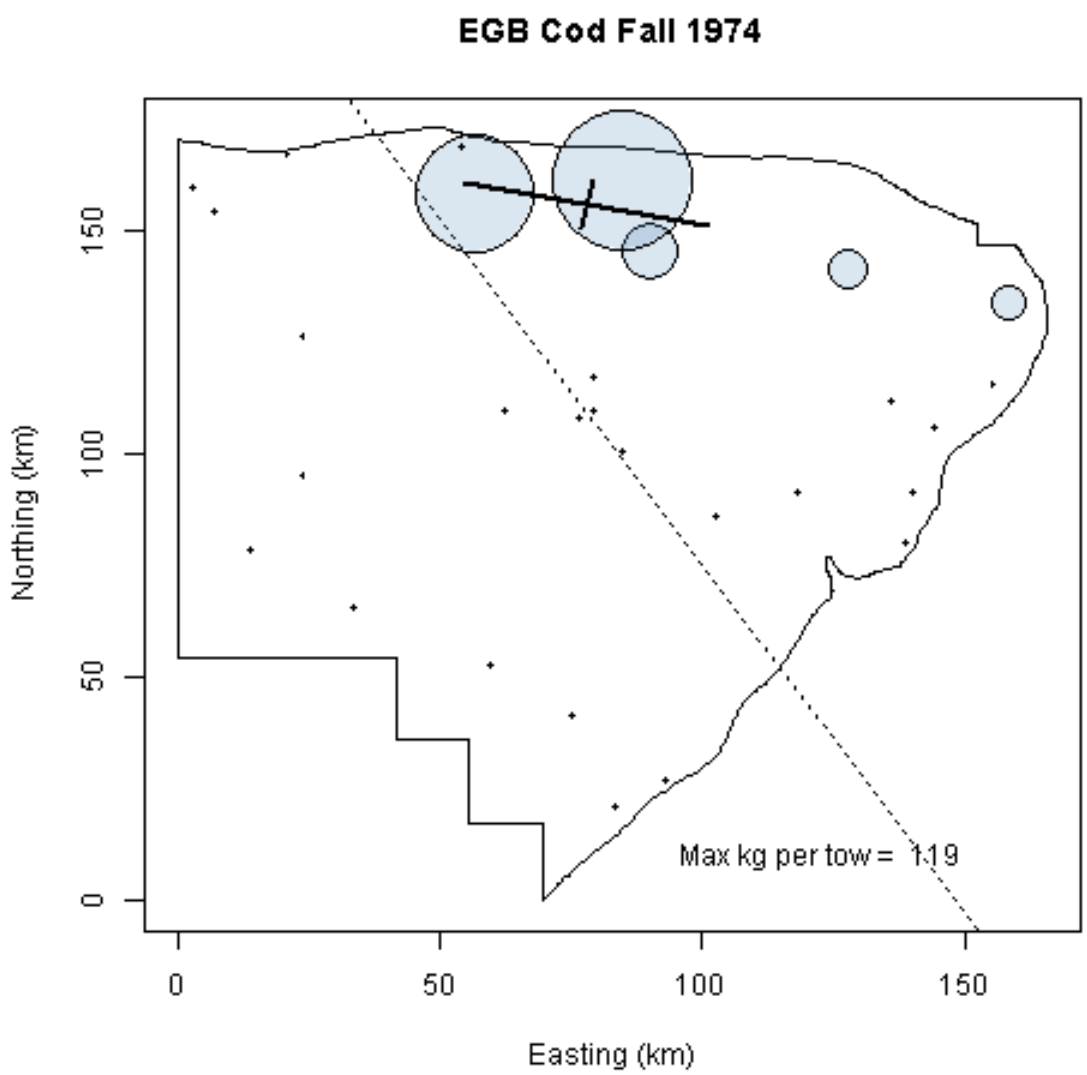

EGB Cod Fall 1969
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 62

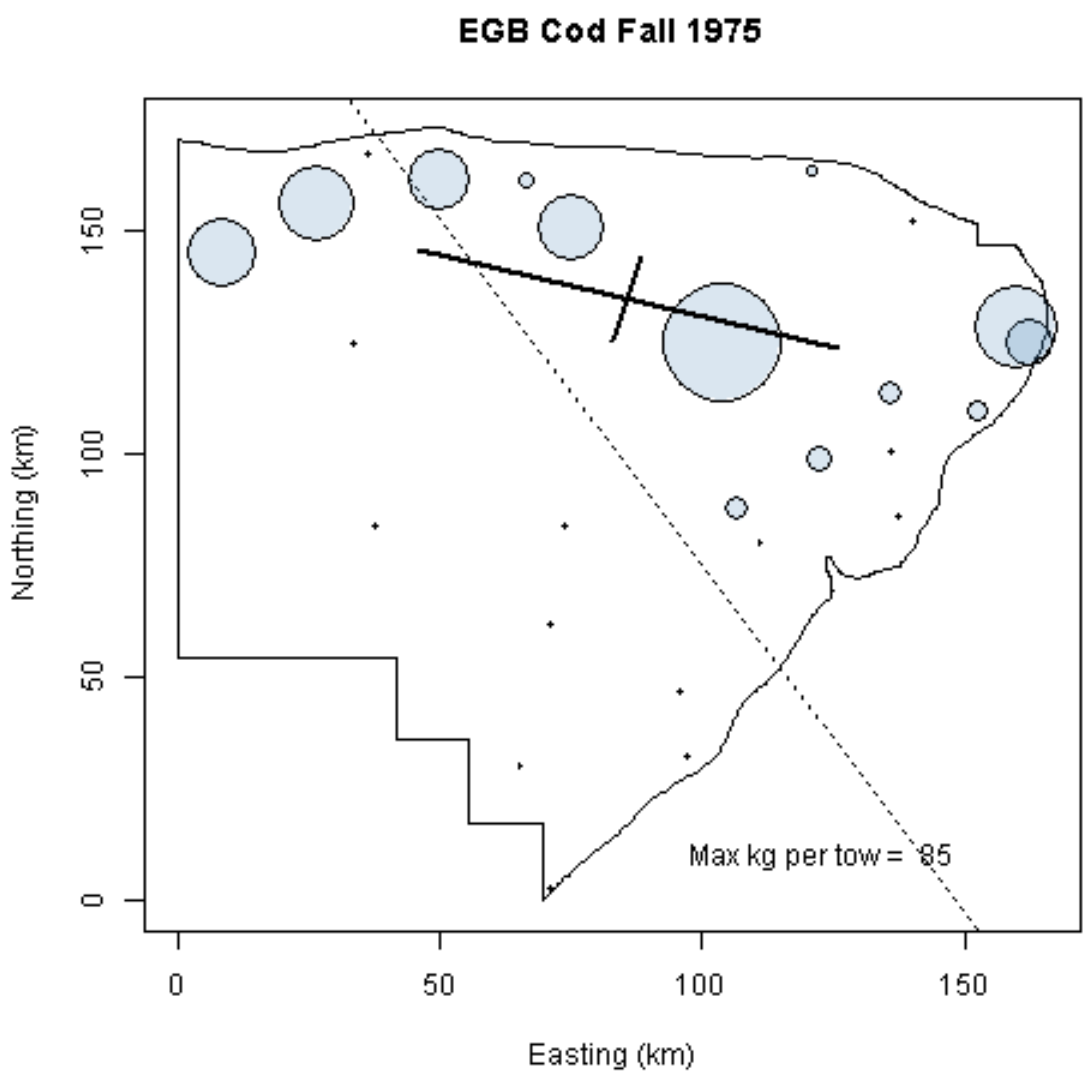

EGB Cod Fall 1970
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 1.11

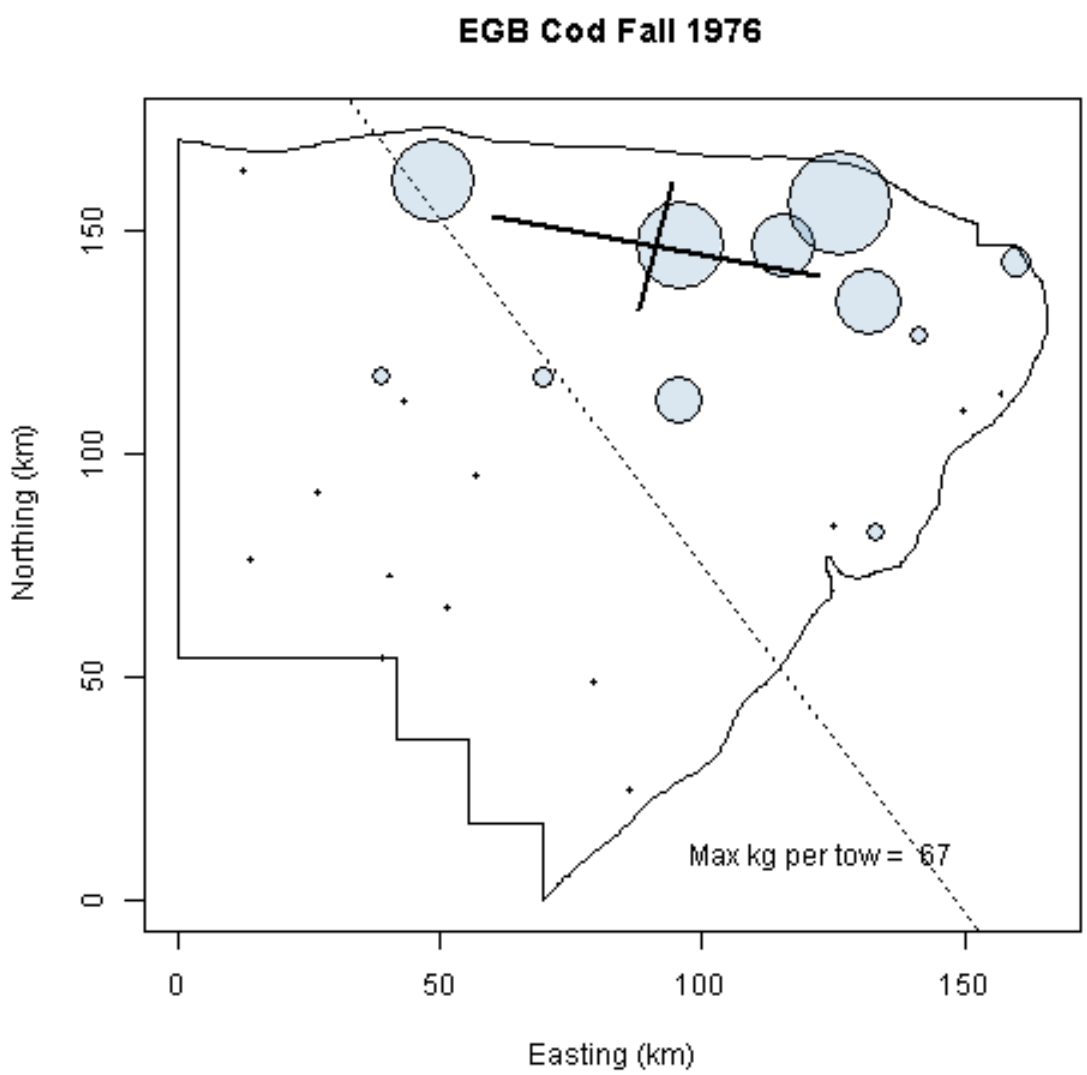

EGB Cod Fall 1971
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 65

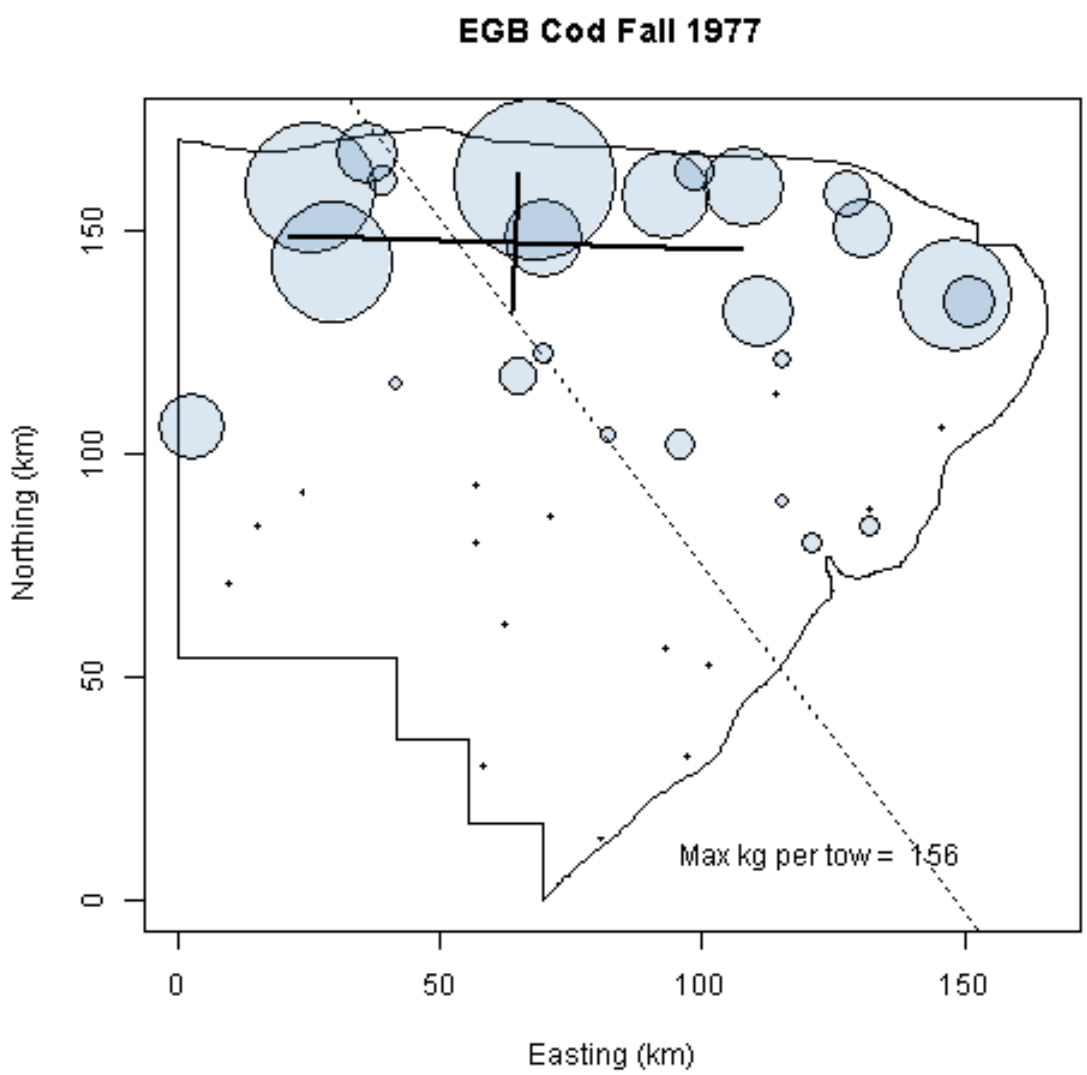

EGB Cod Fall 1972
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 44

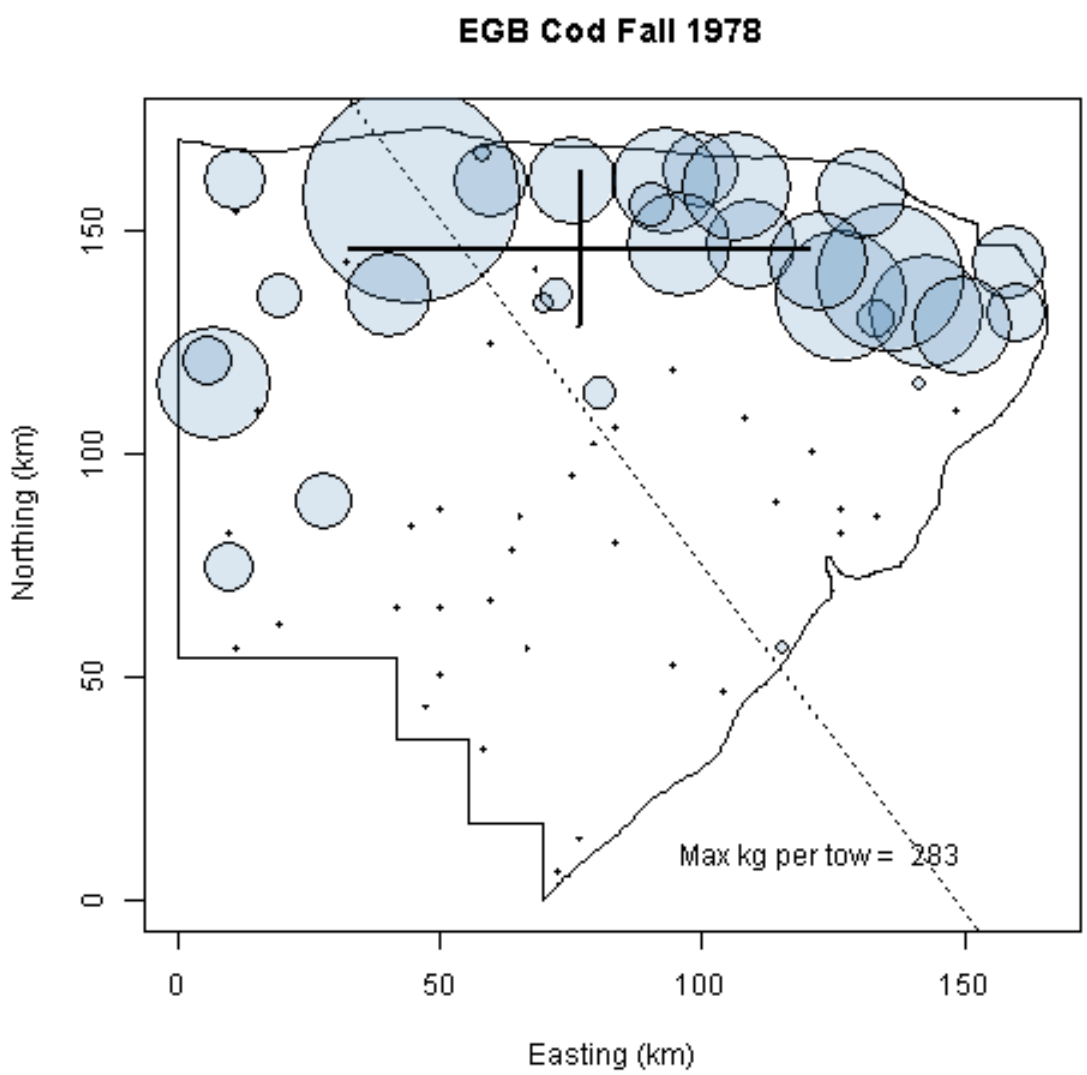

EGB Cod Fall 1973
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 452

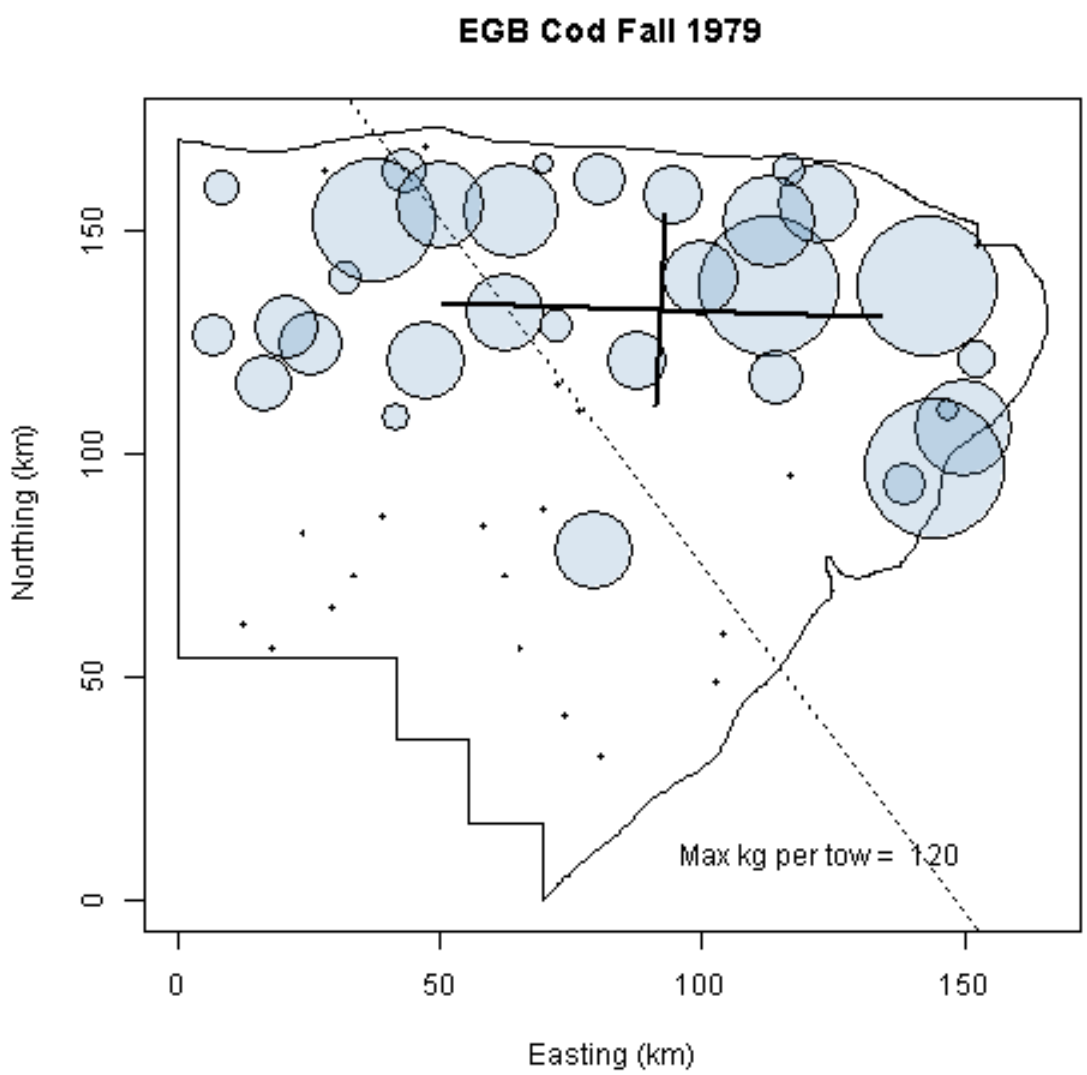

EGB Cod Fall 1974
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 1.19

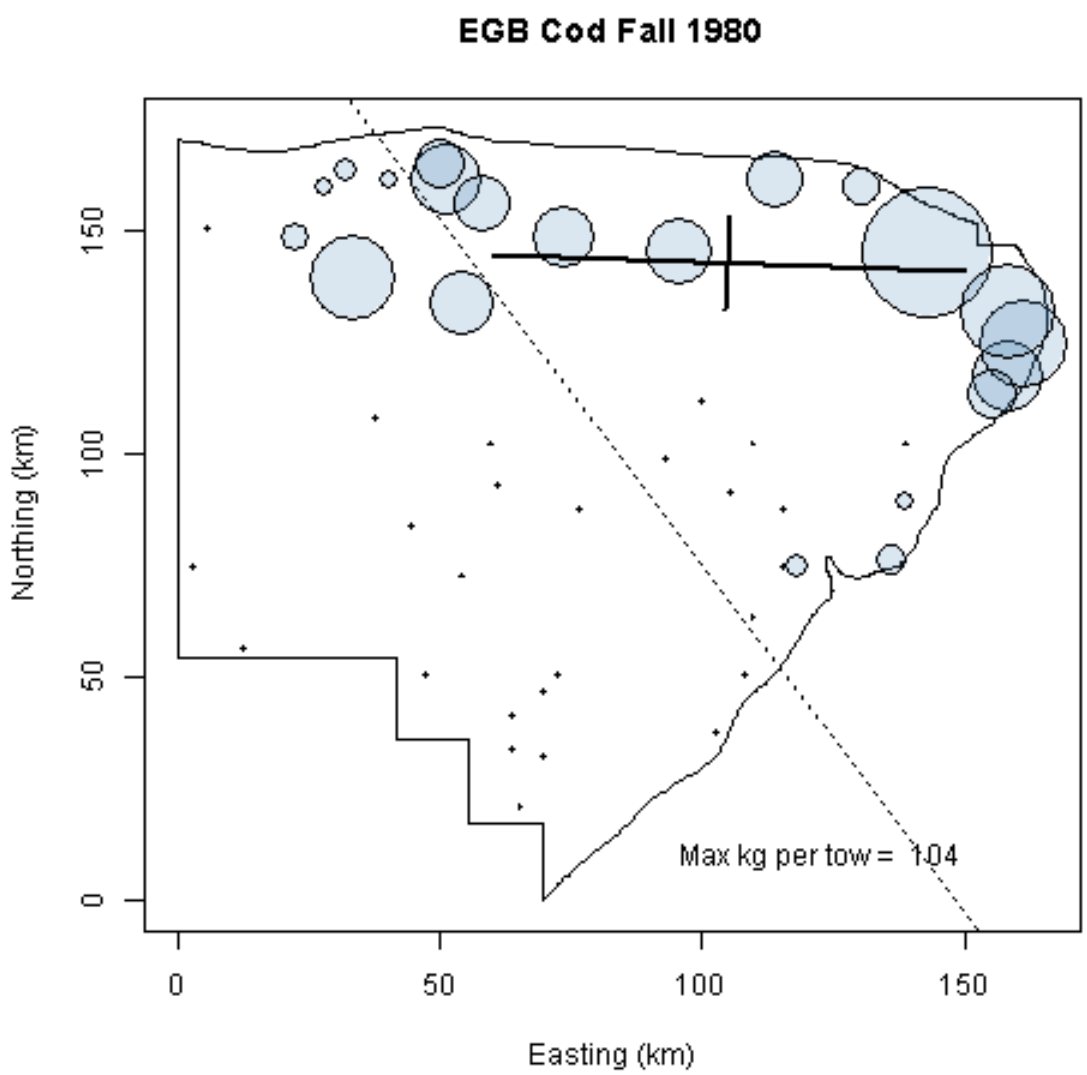

EGB Cod Fall 1975
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 85

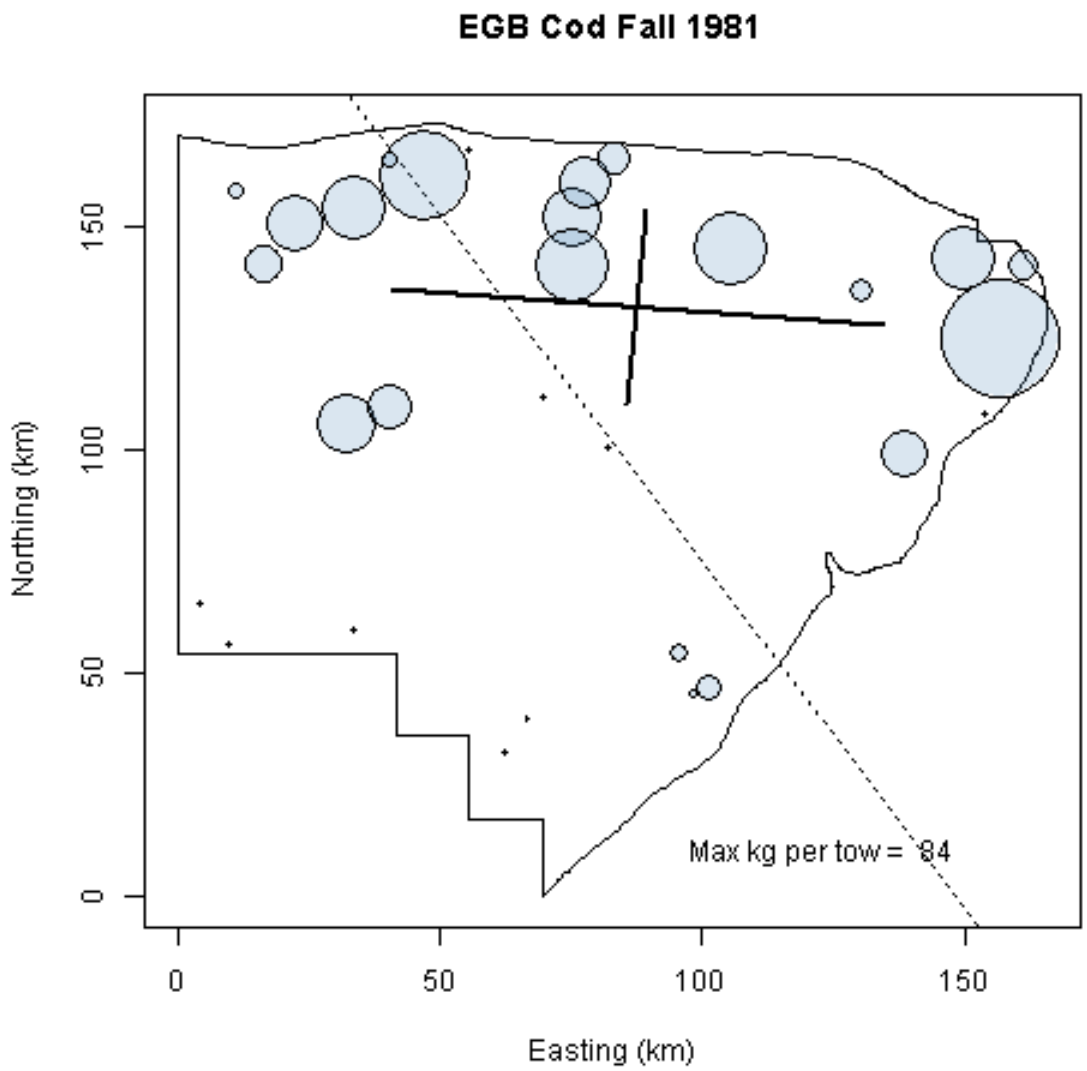

EGB Cod Fall 1976
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 67

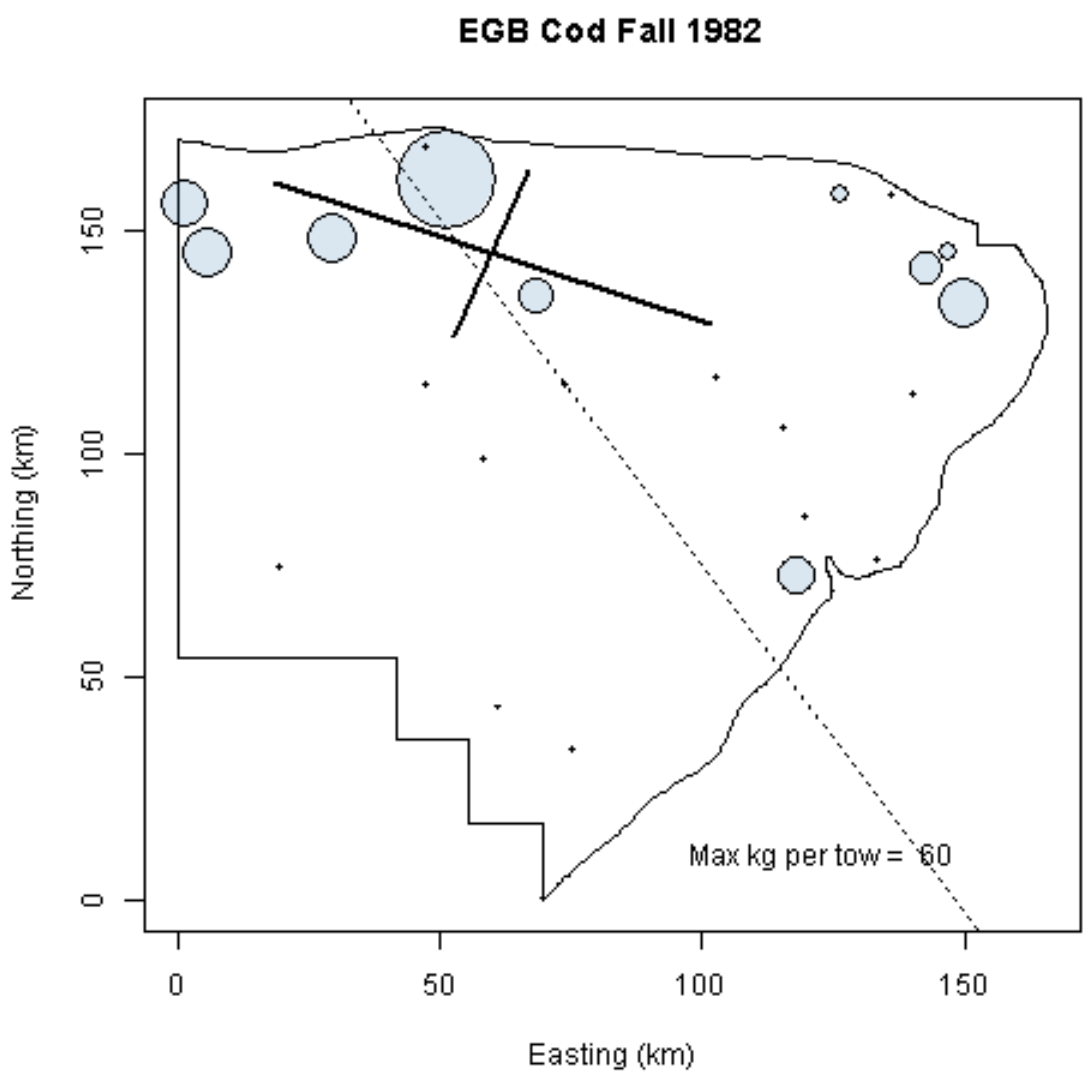

EGB Cod Fall 1977
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 156

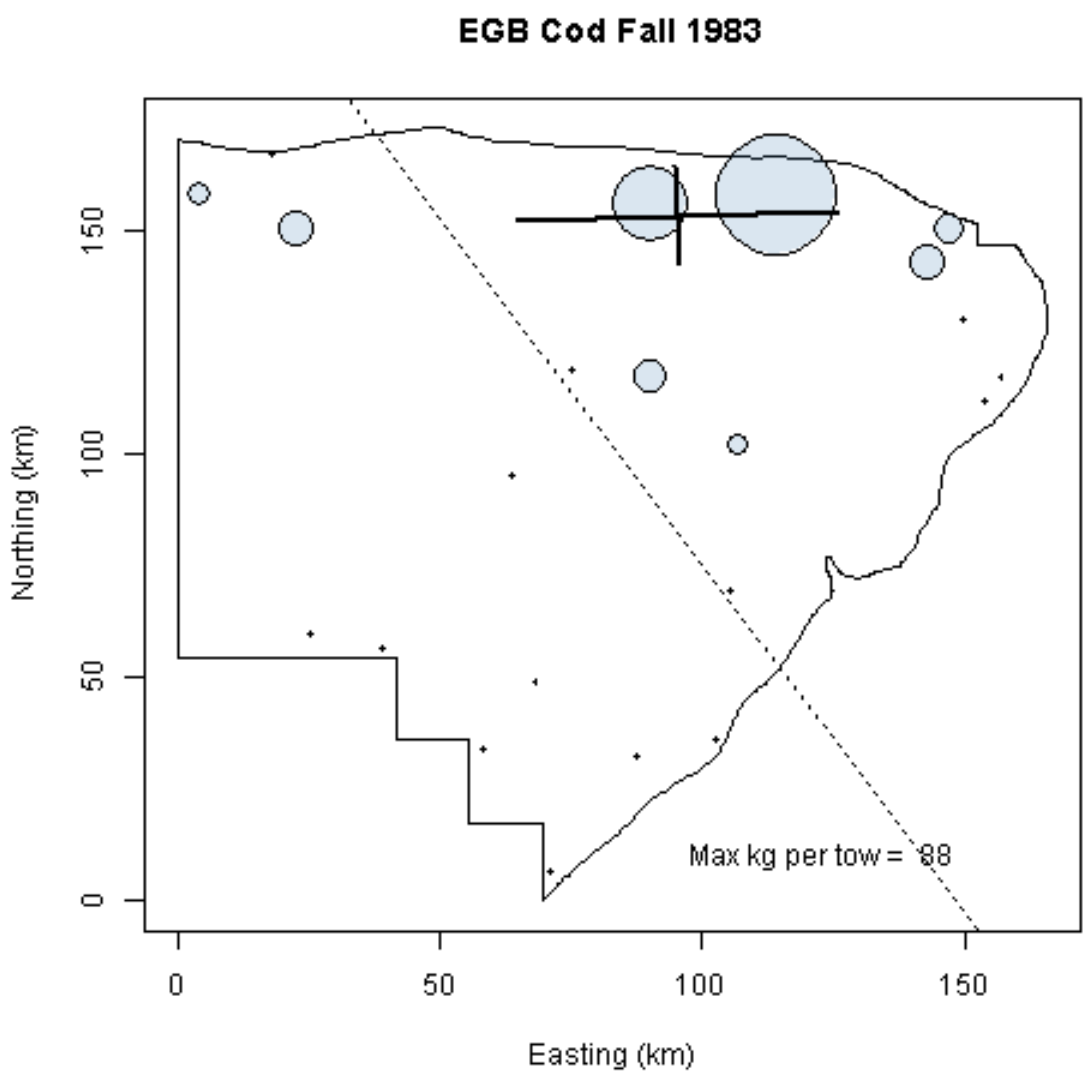

EGB Cod Fall 1978
Northing (km)
Easting (km)
0
50
100
150
Max kg per tow = 283

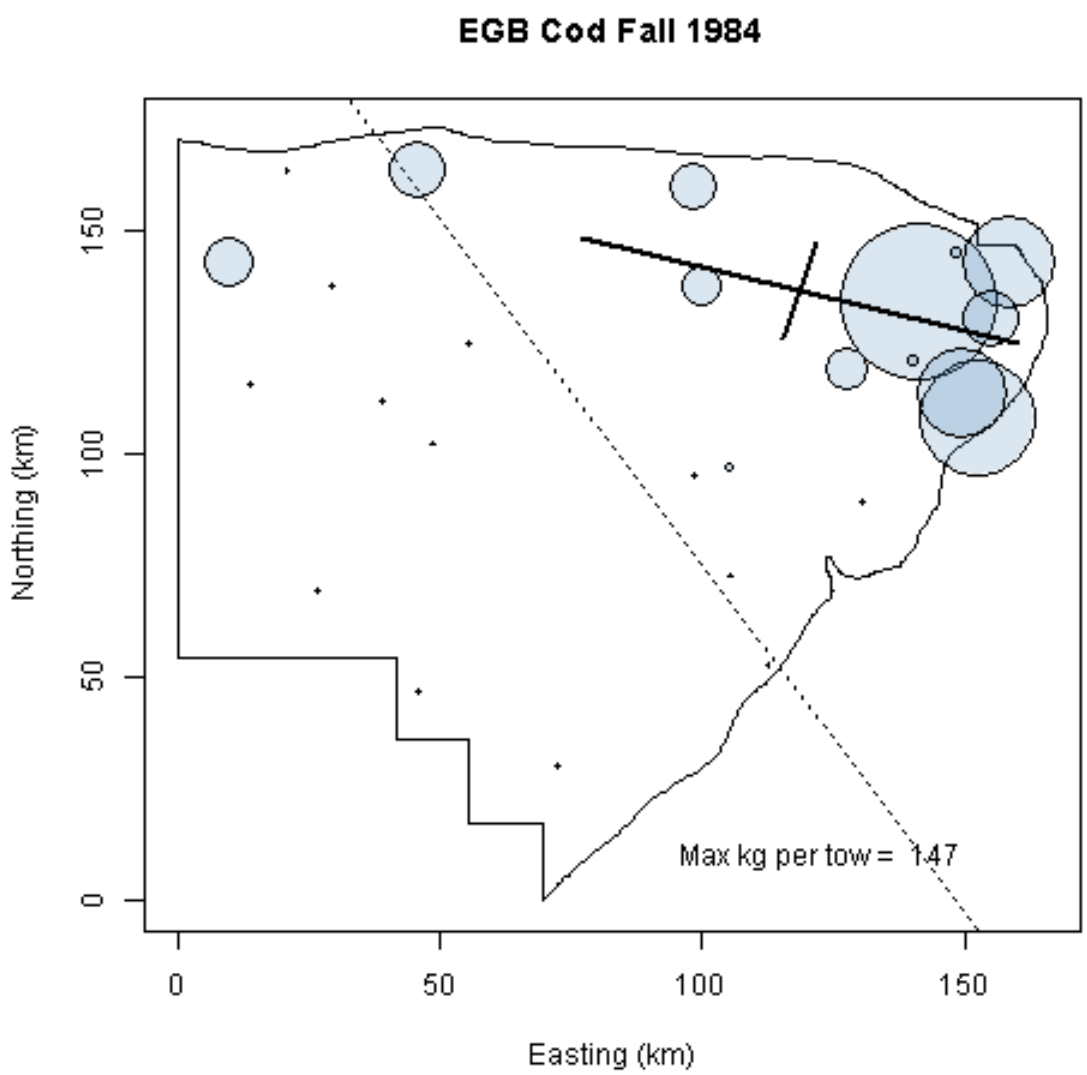

EGB Cod Fall 1979
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 120

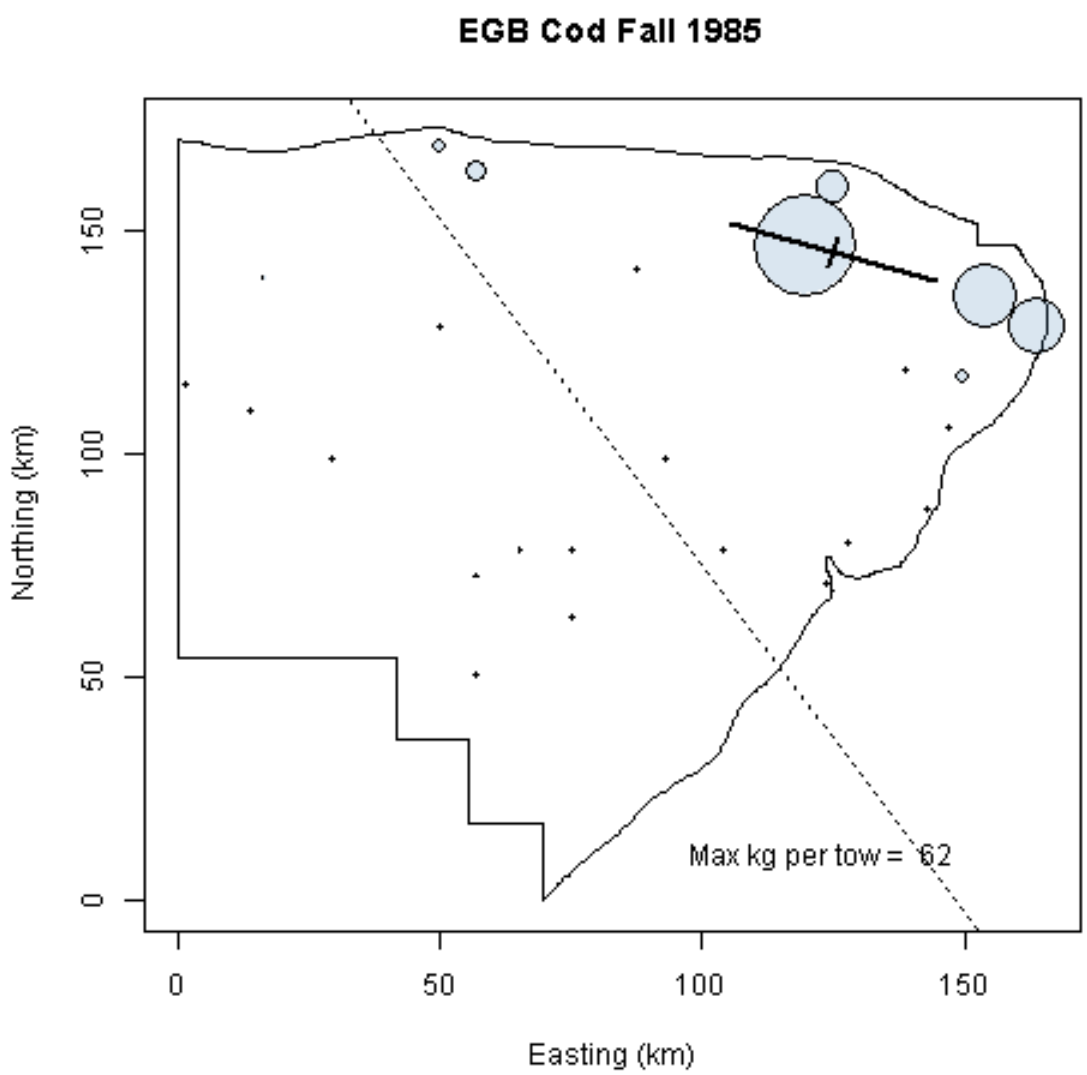

EGB Cod Fall 1980
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 104

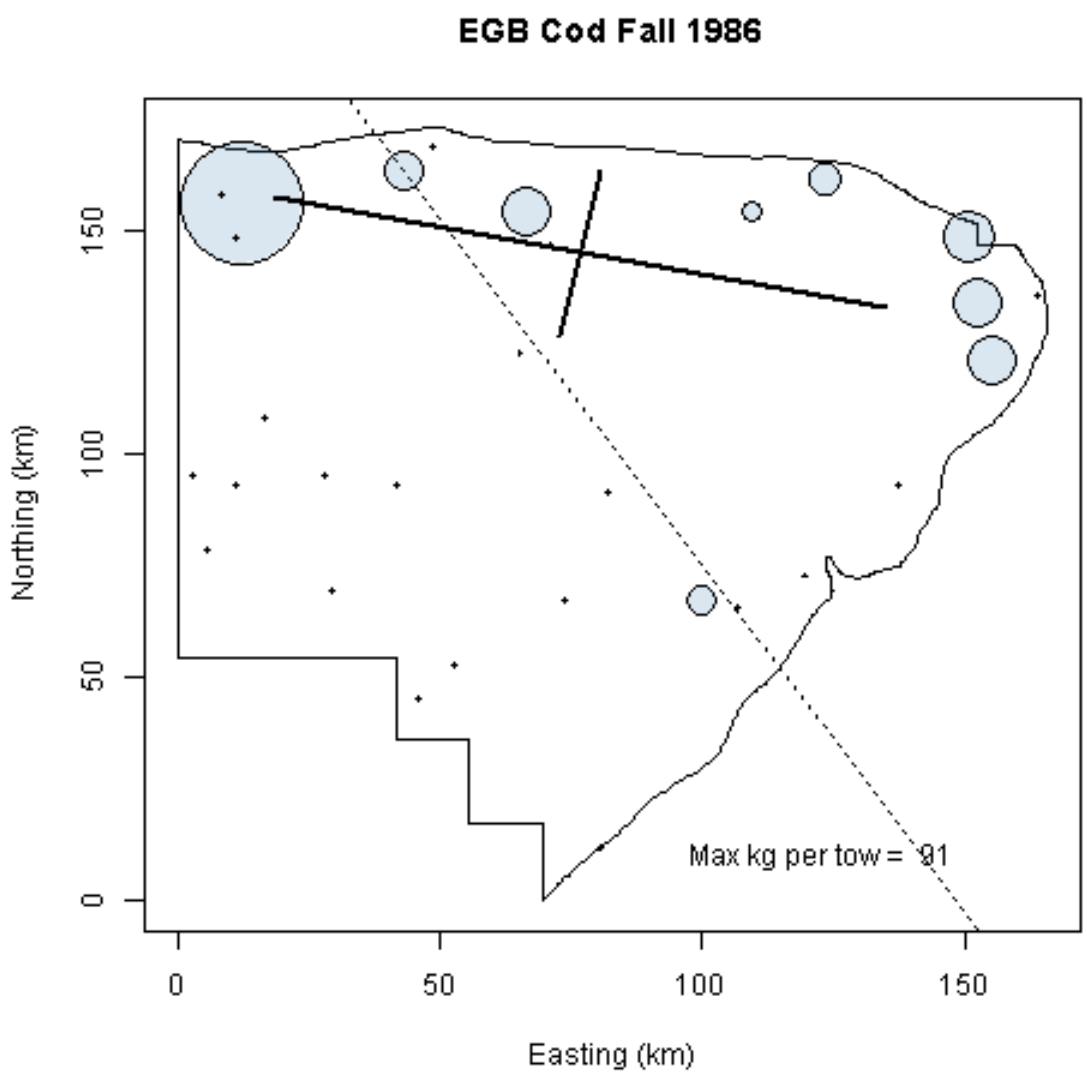

EGB Cod Fall 1981
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 84

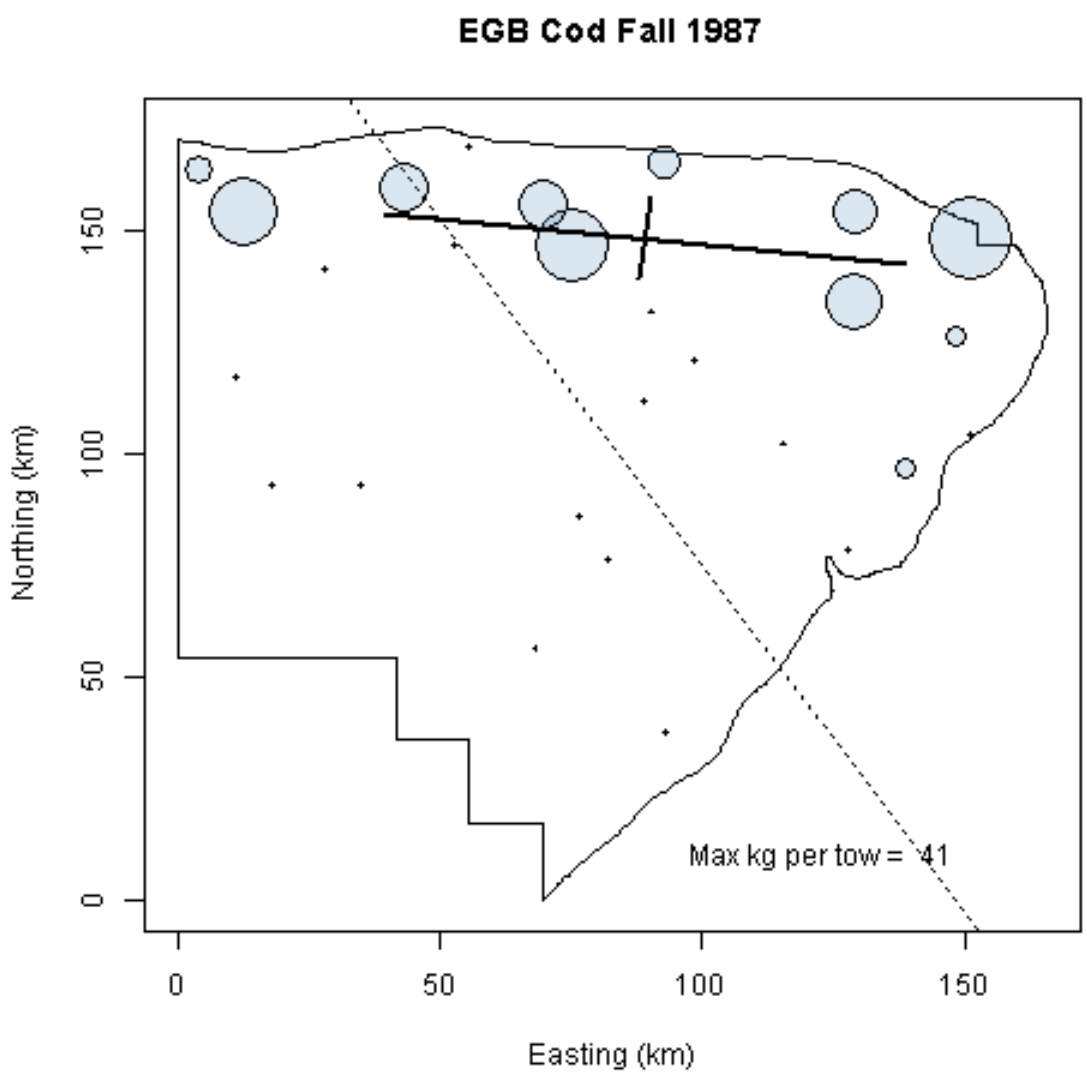

EGB Cod Fall 1982
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 60

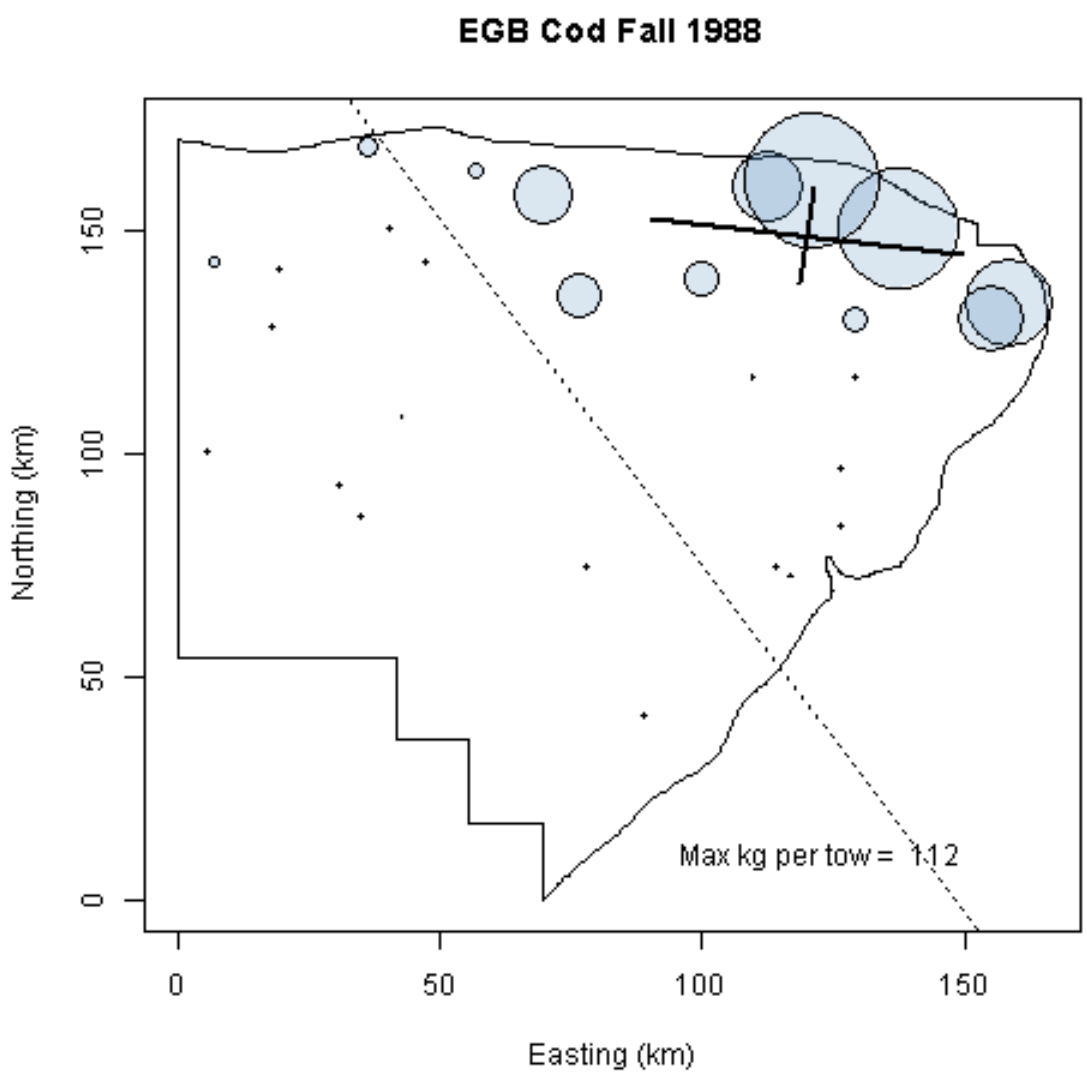

EGB Cod Fall 1983
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 88

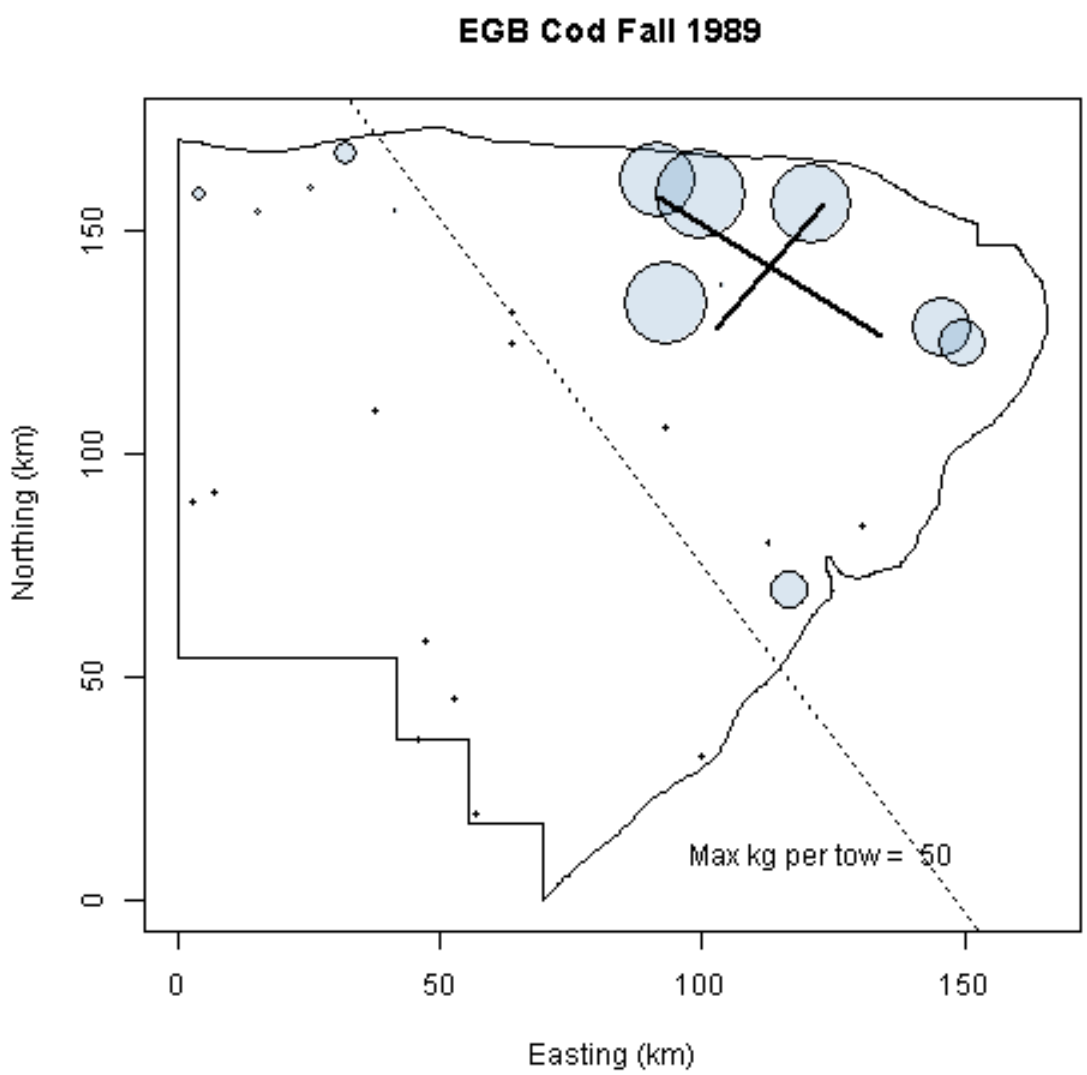

EGB Cod Fall 1984
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 147

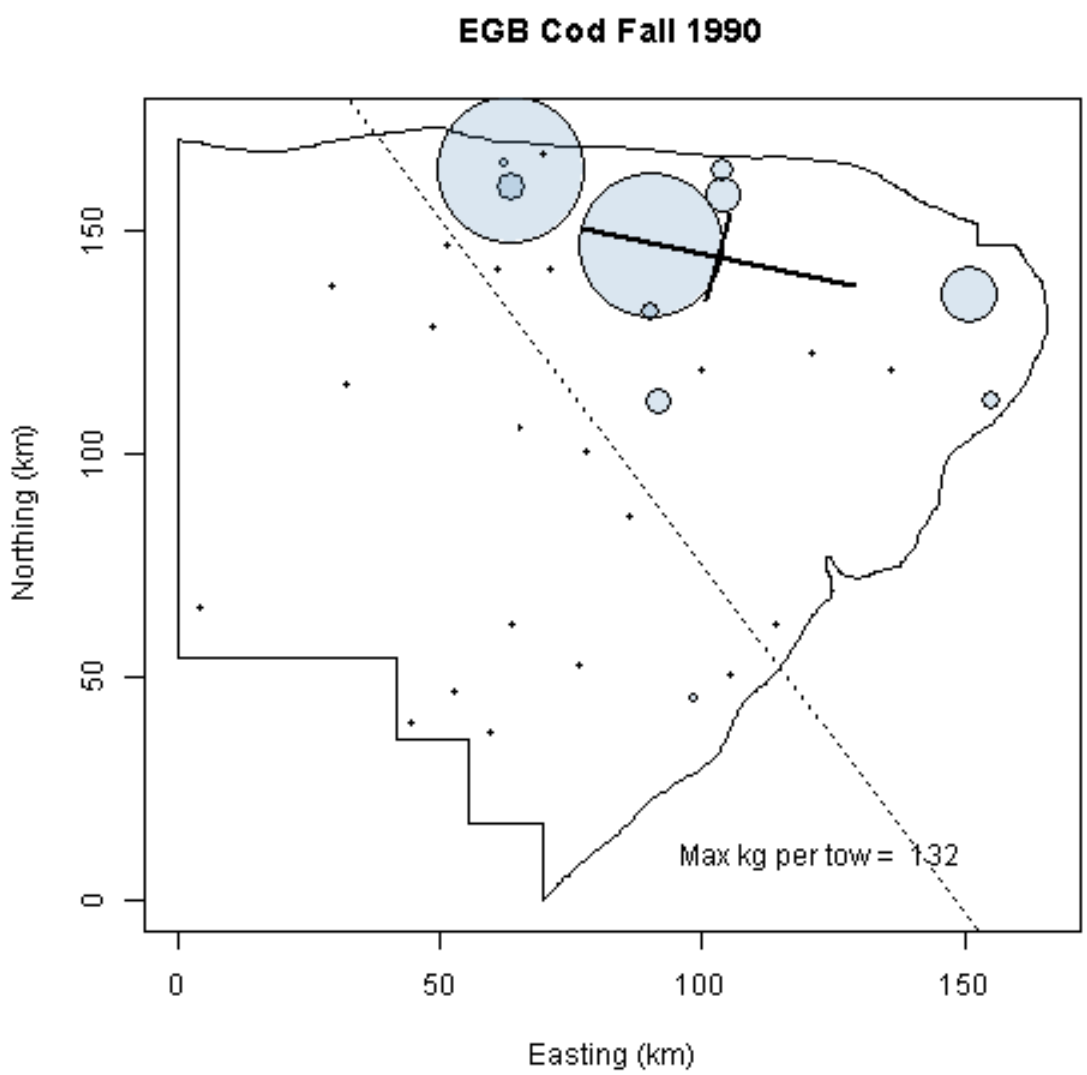

EGB Cod Fall 1985
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 62

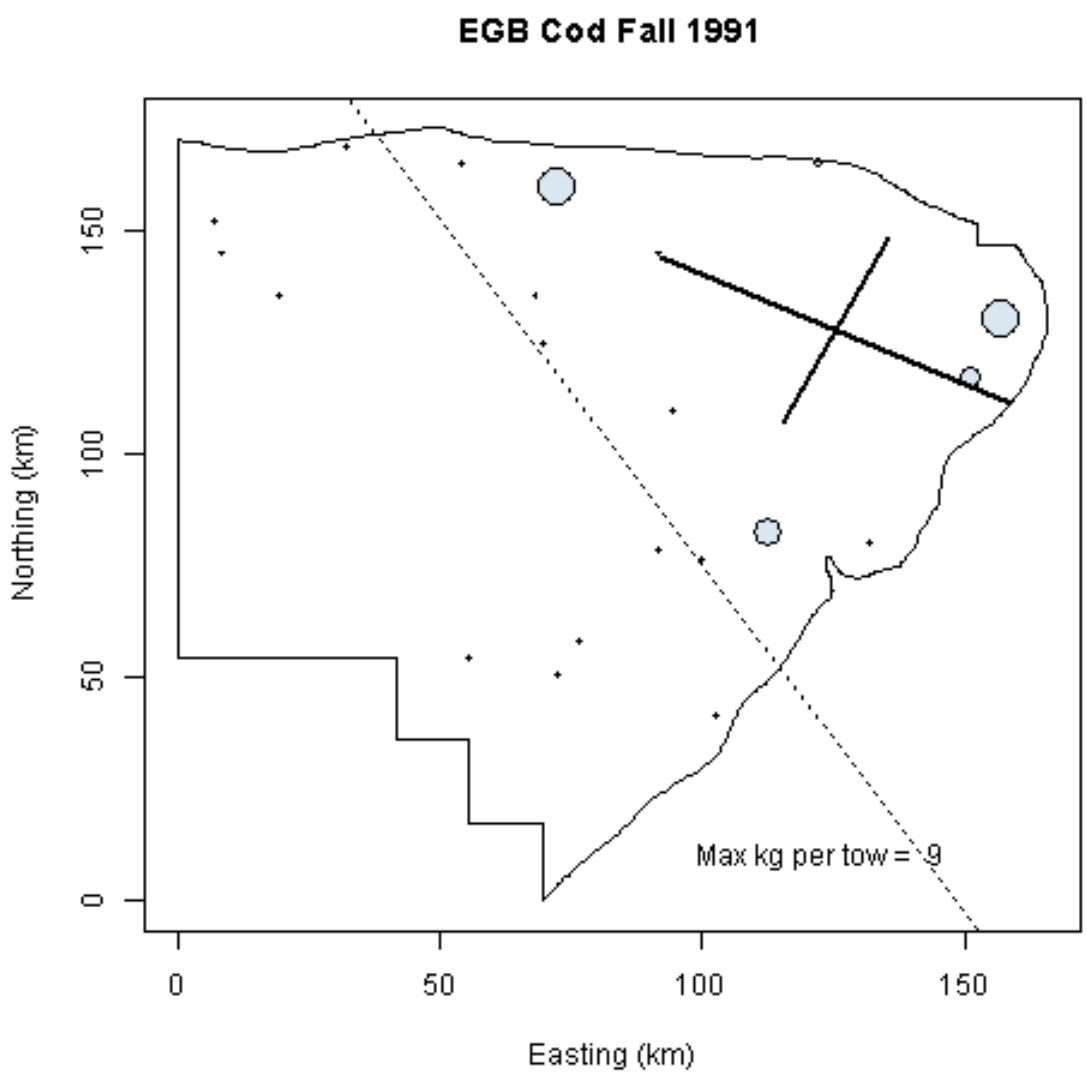

EGB Cod Fall 1986
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 91

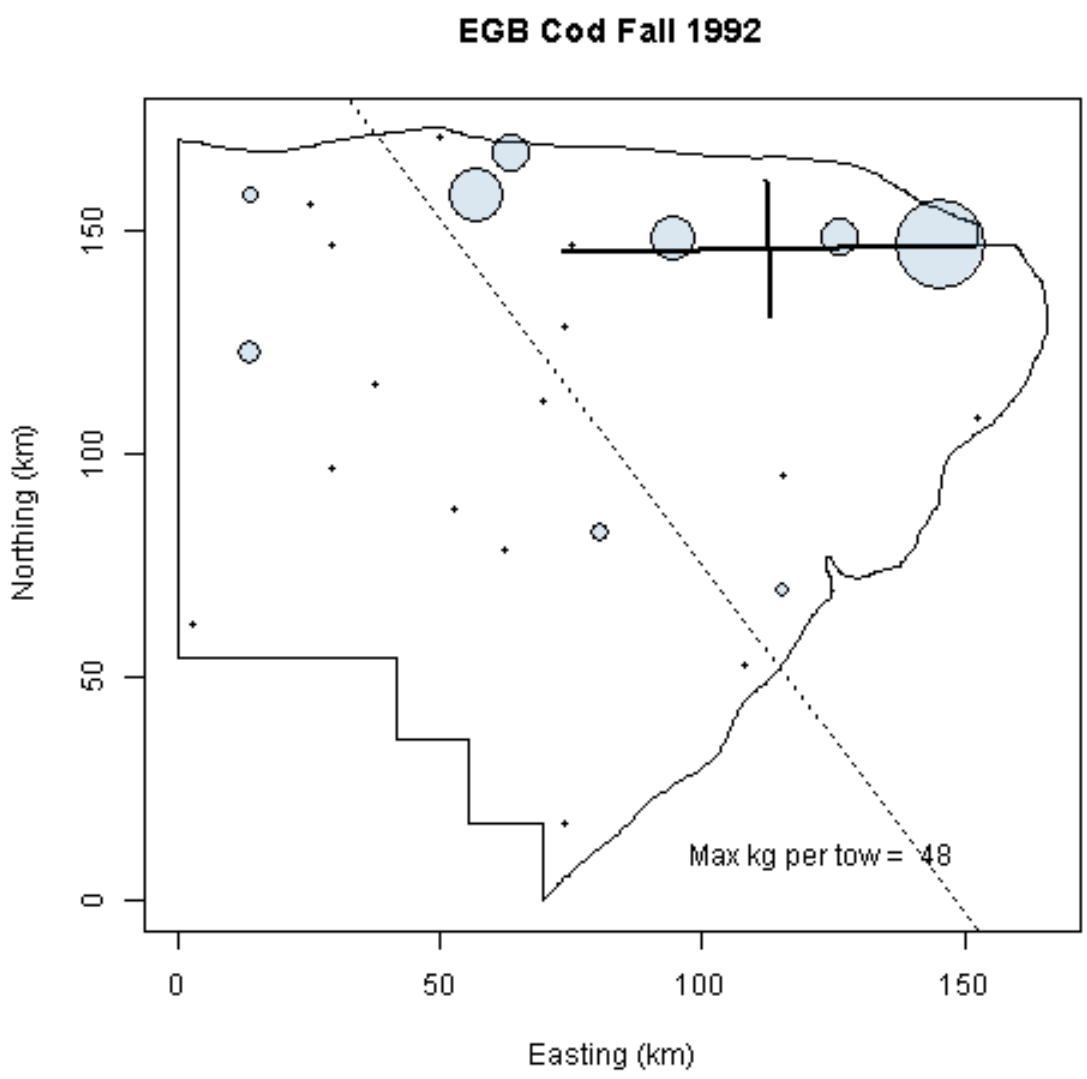

EGB Cod Fall 1987
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 41

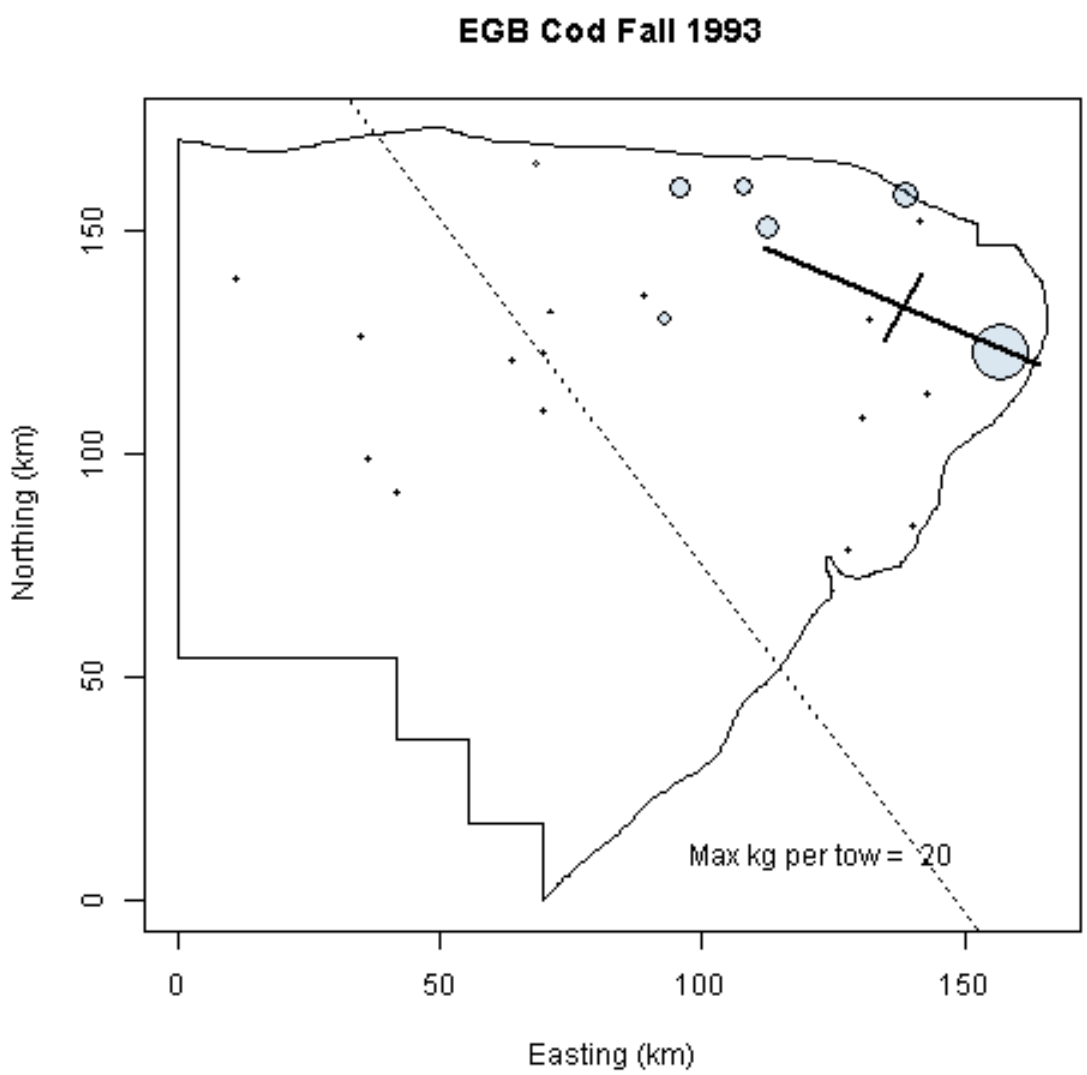

EGB Cod Fall 1988
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 112

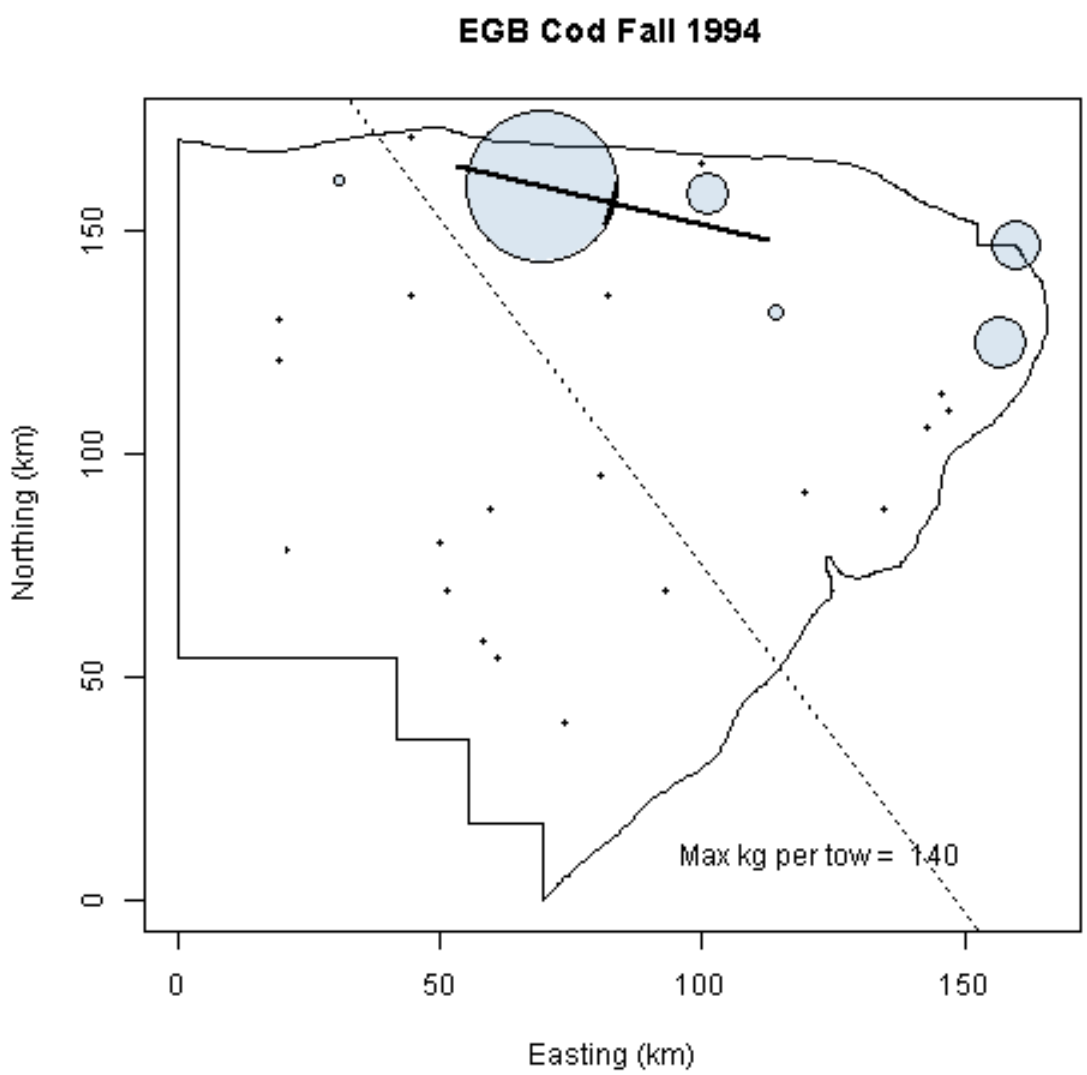

EGB Cod Fall 1989
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 50

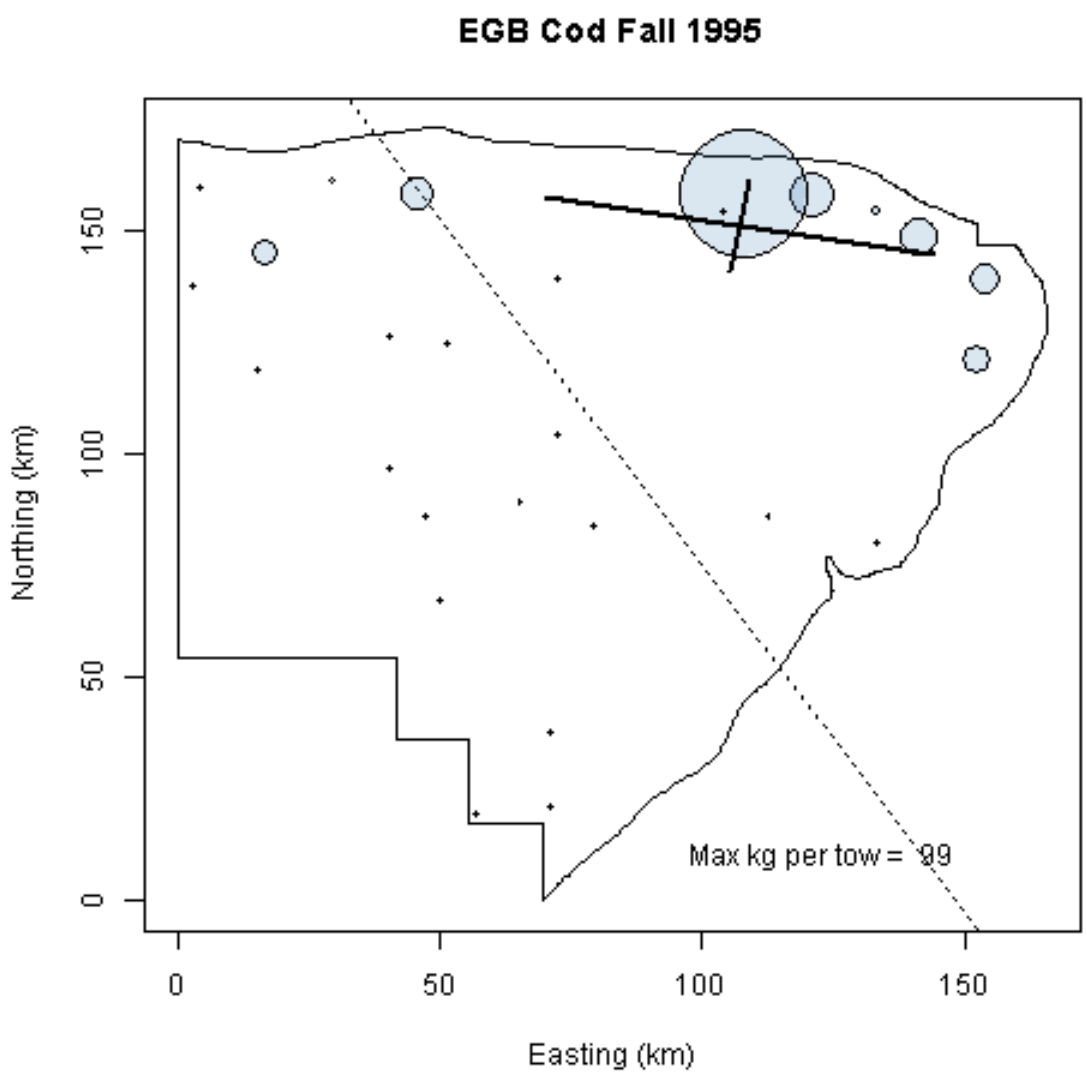

EGB Cod Fall 1990
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 132

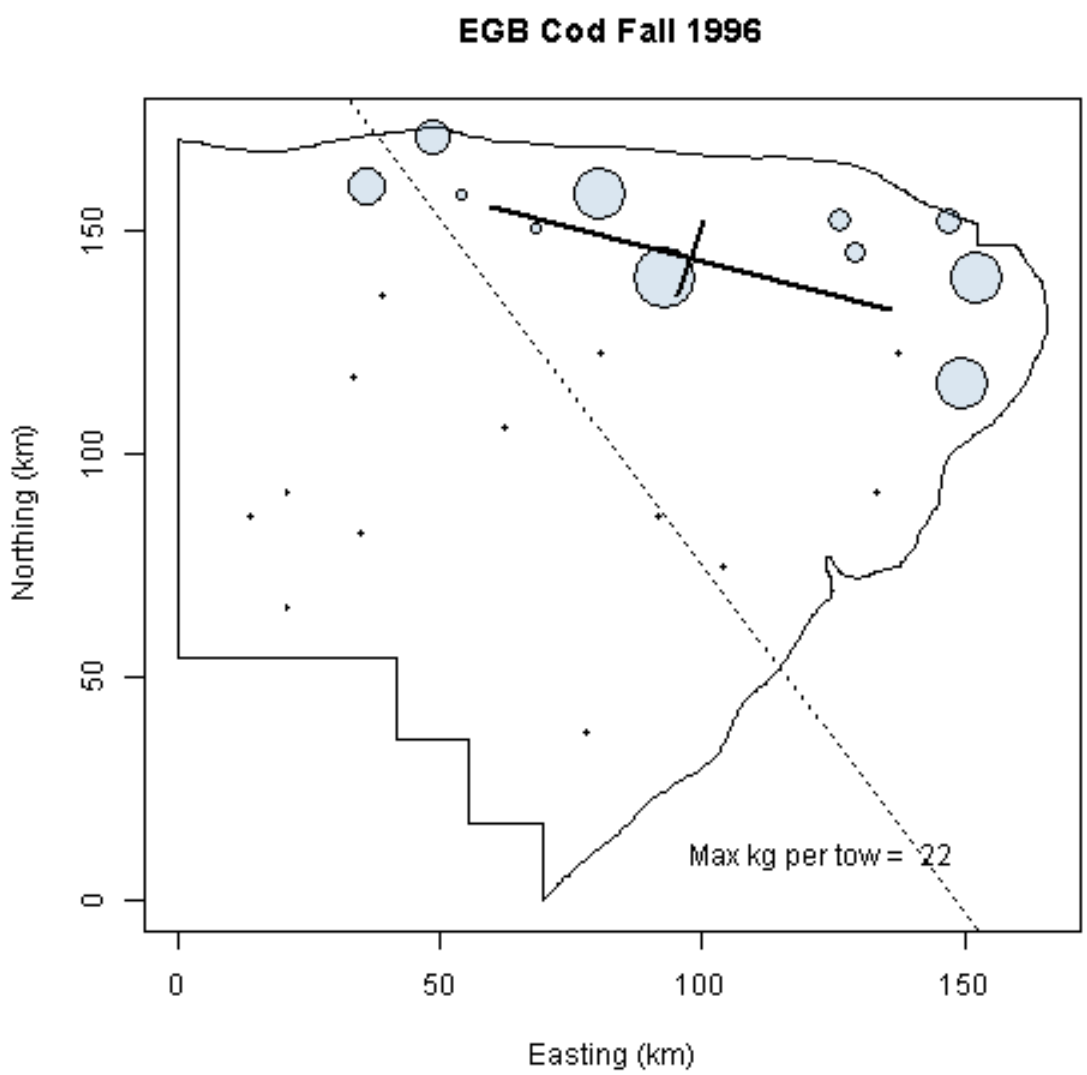

EGB Cod Fall 1991
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 9

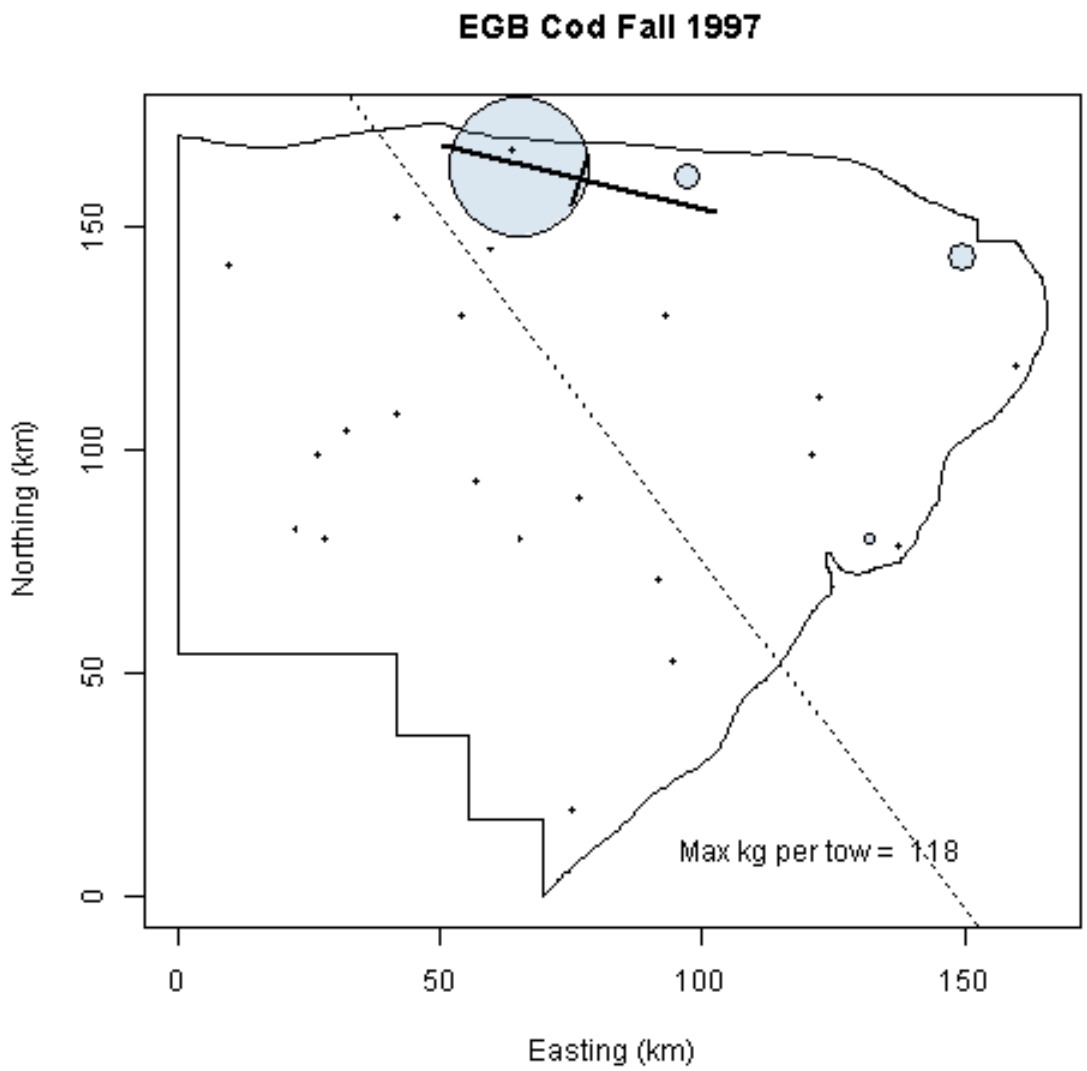

EGB Cod Fall 1992
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 48

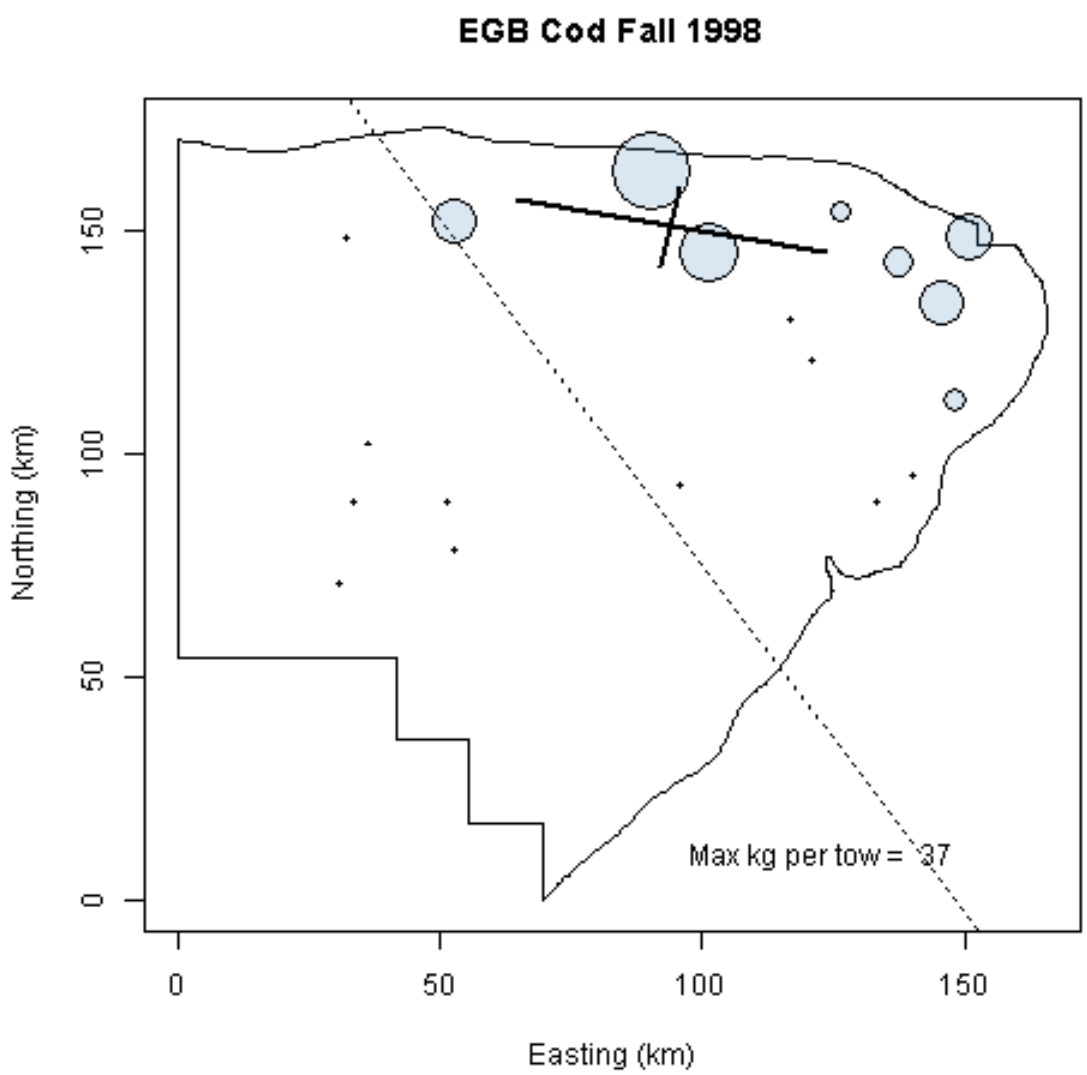

EGB Cod Fall 1993
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 20

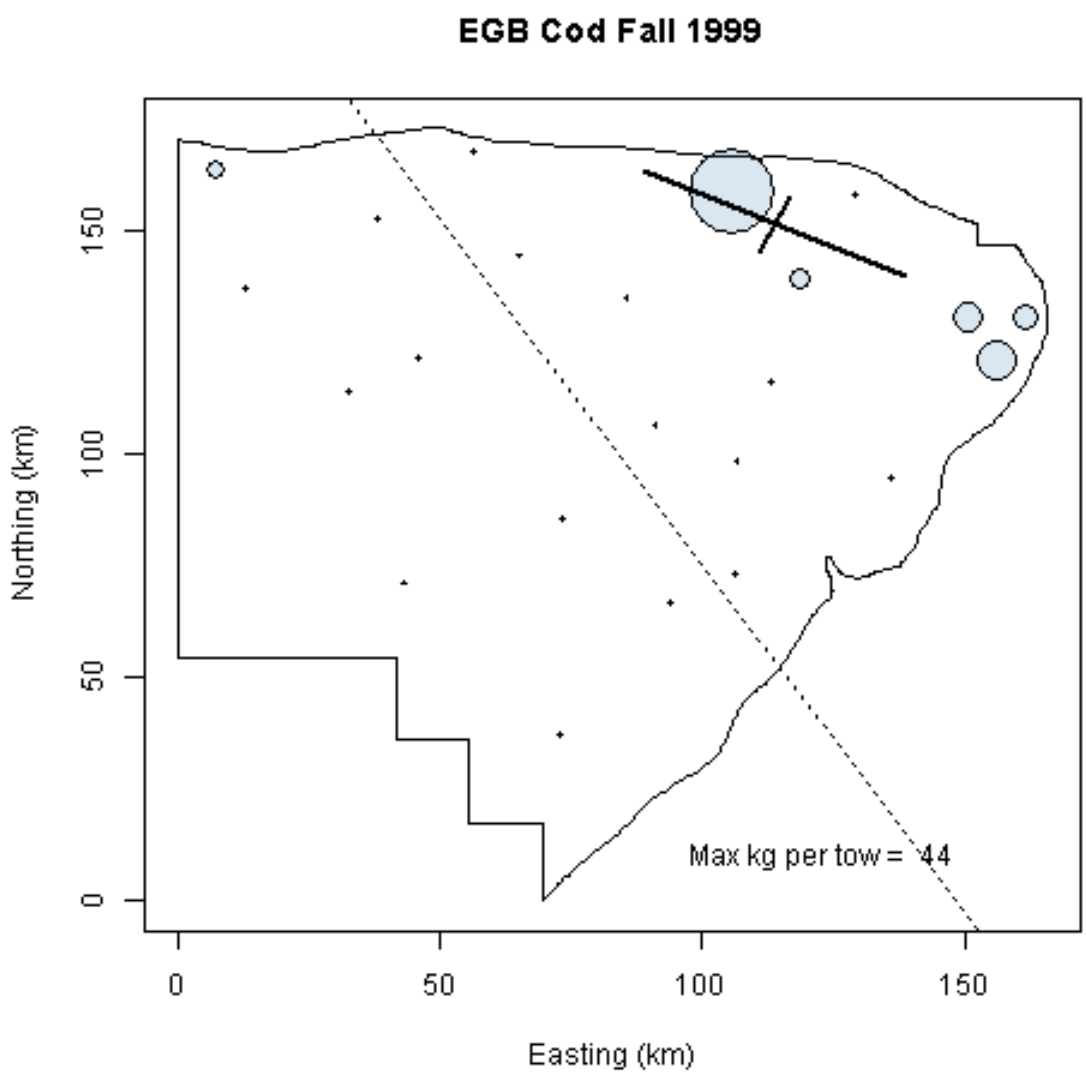

EGB Cod Fall 1994
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 140

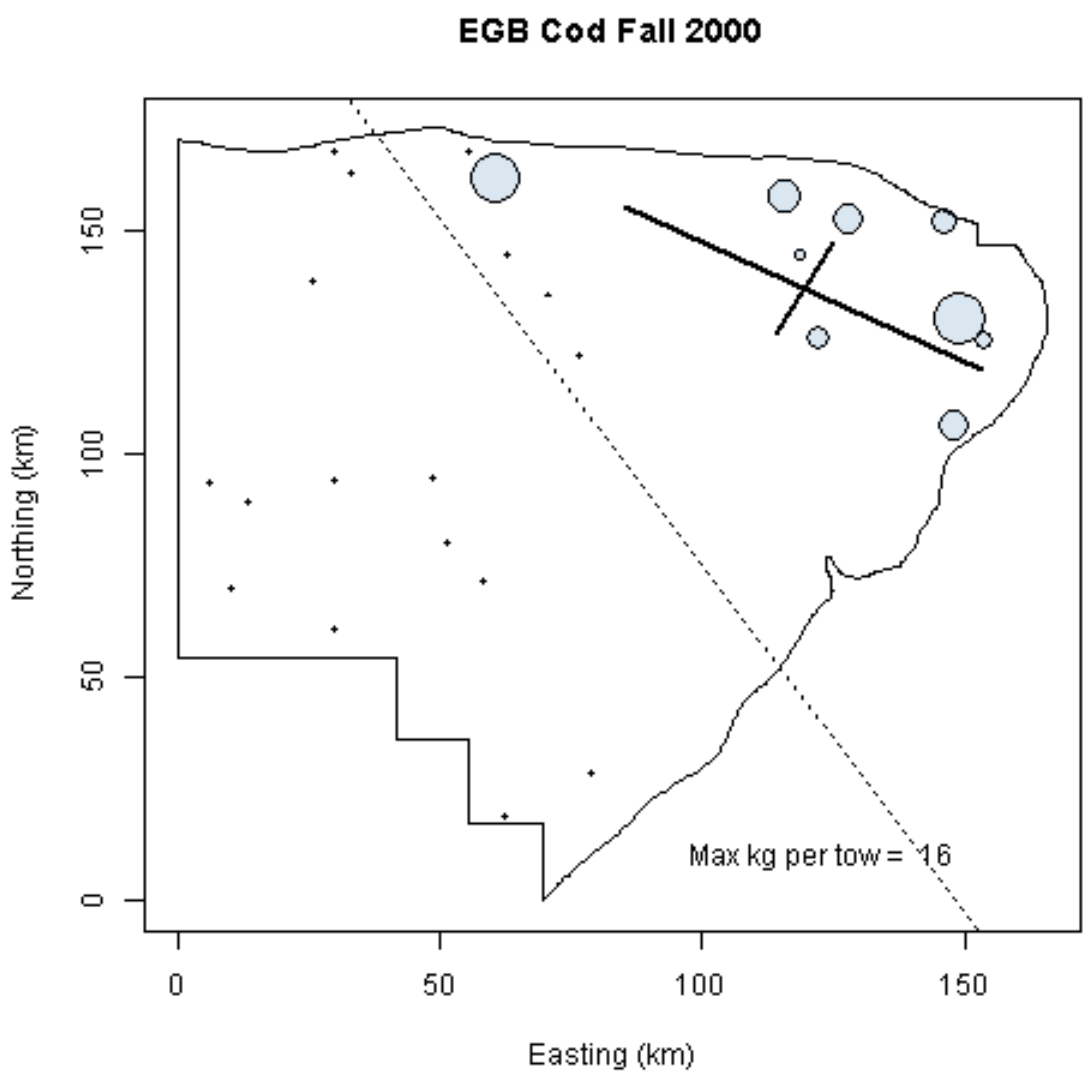

EGB Cod Fall 1995
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 99

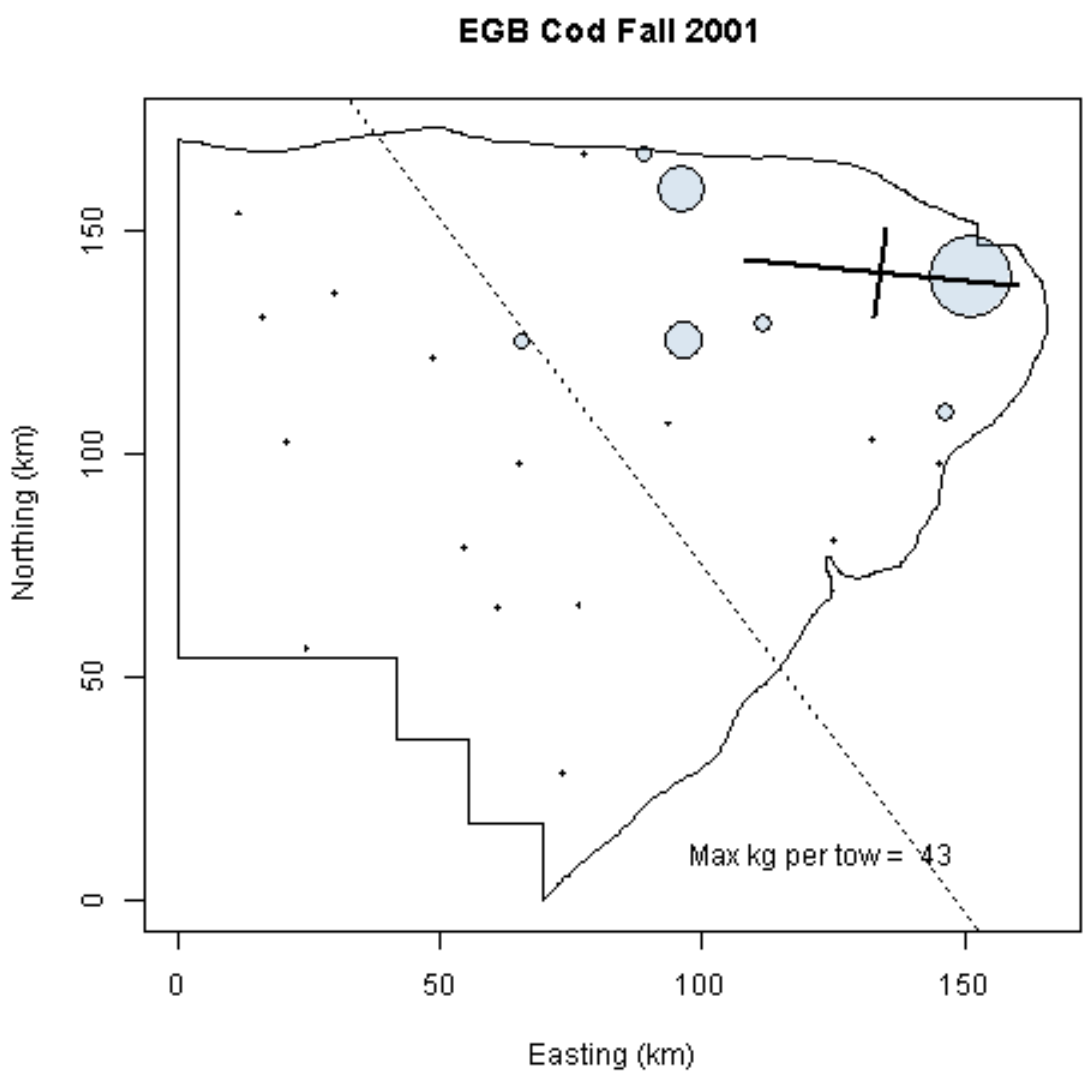

EGB Cod Fall 1996
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 22

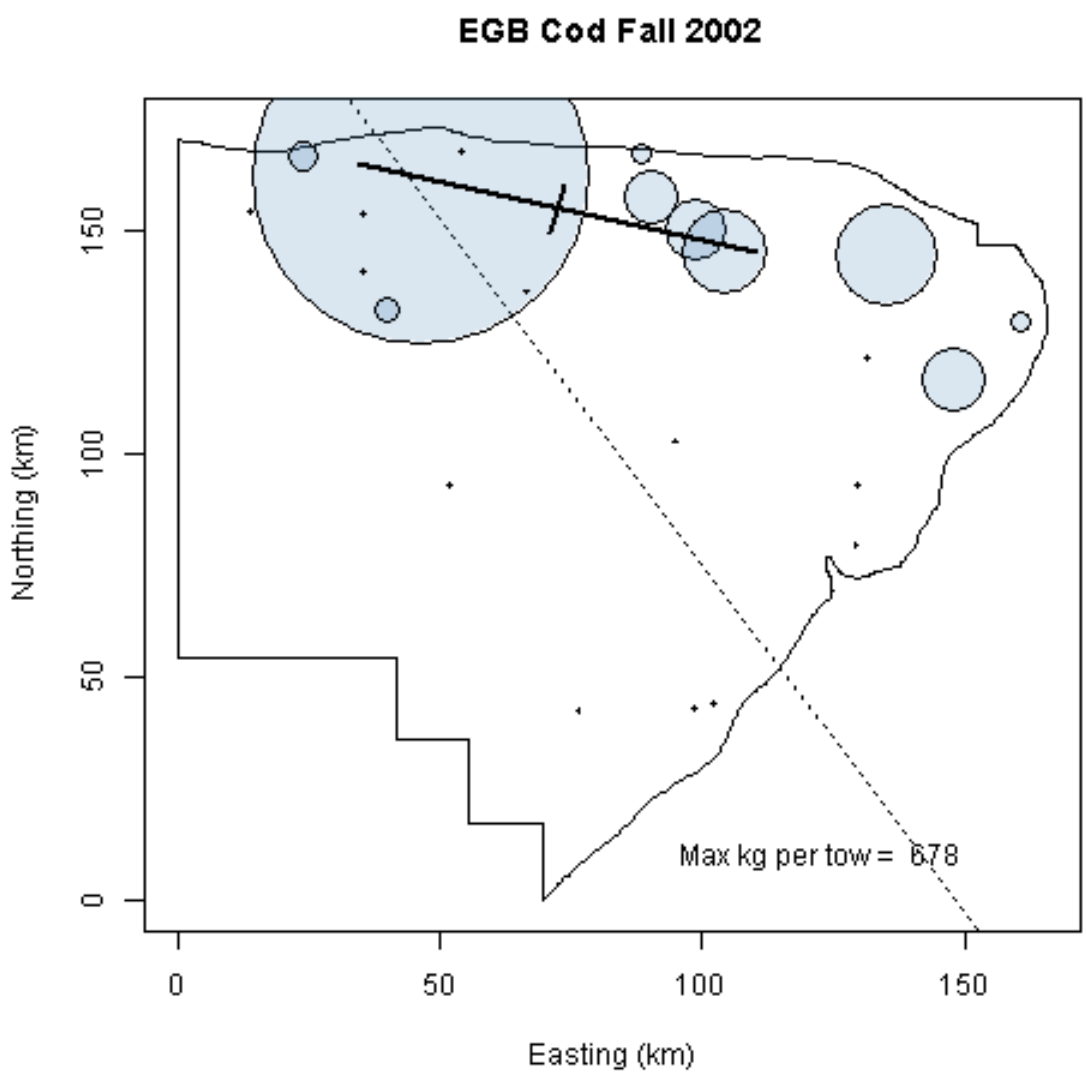

EGB Cod Fall 1997
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 118

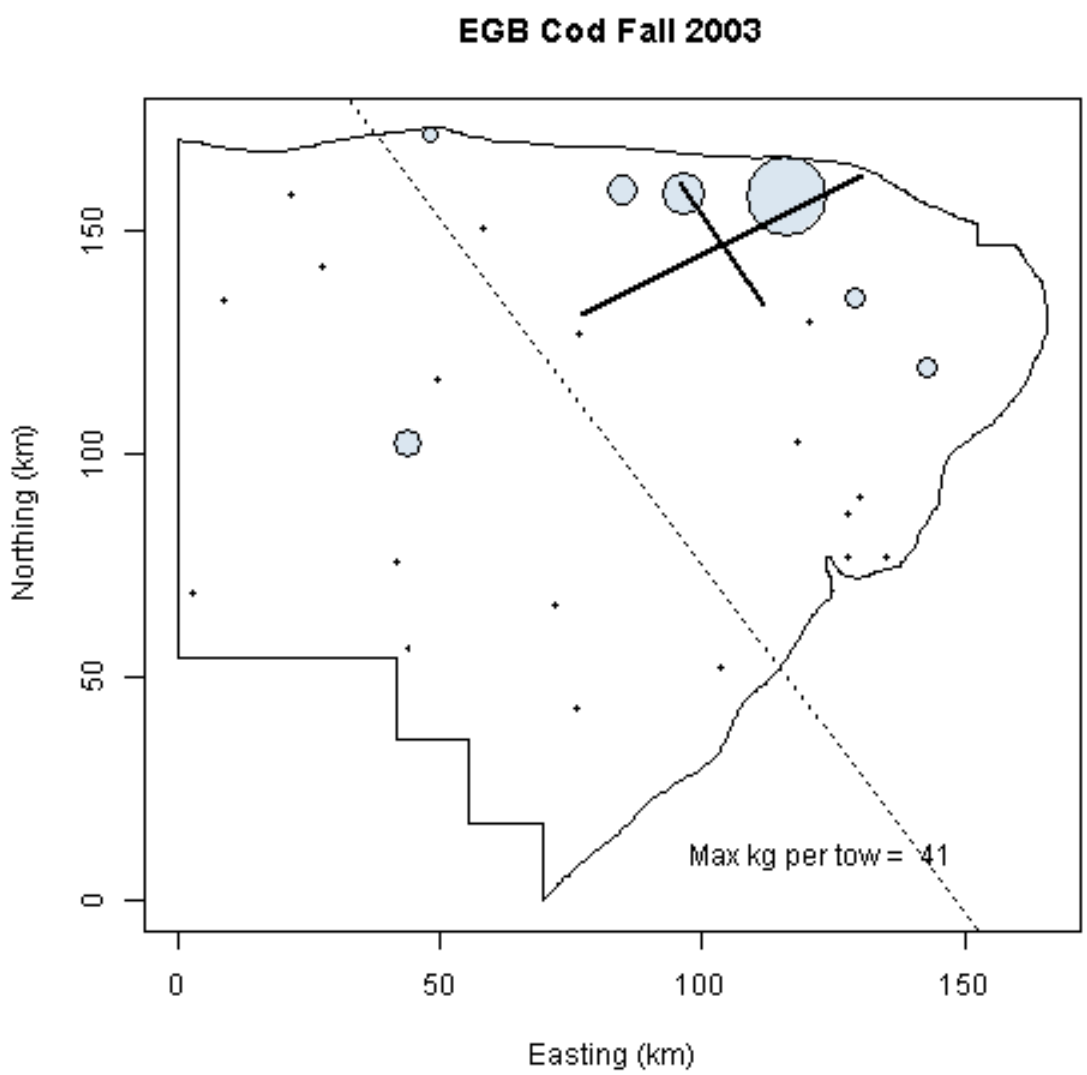

EGB Cod Fall 1998
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 37

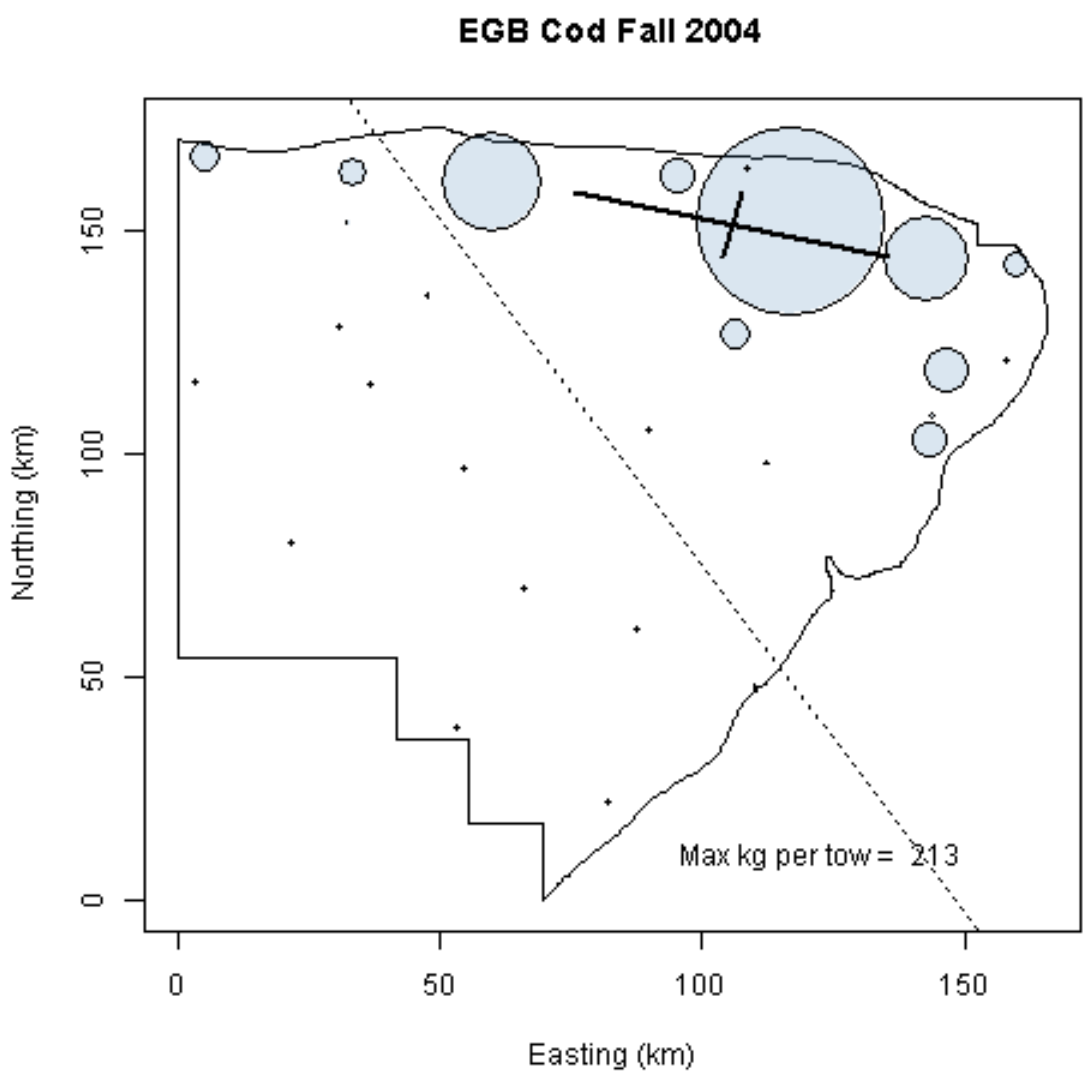

EGB Cod Fall 1999
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 44

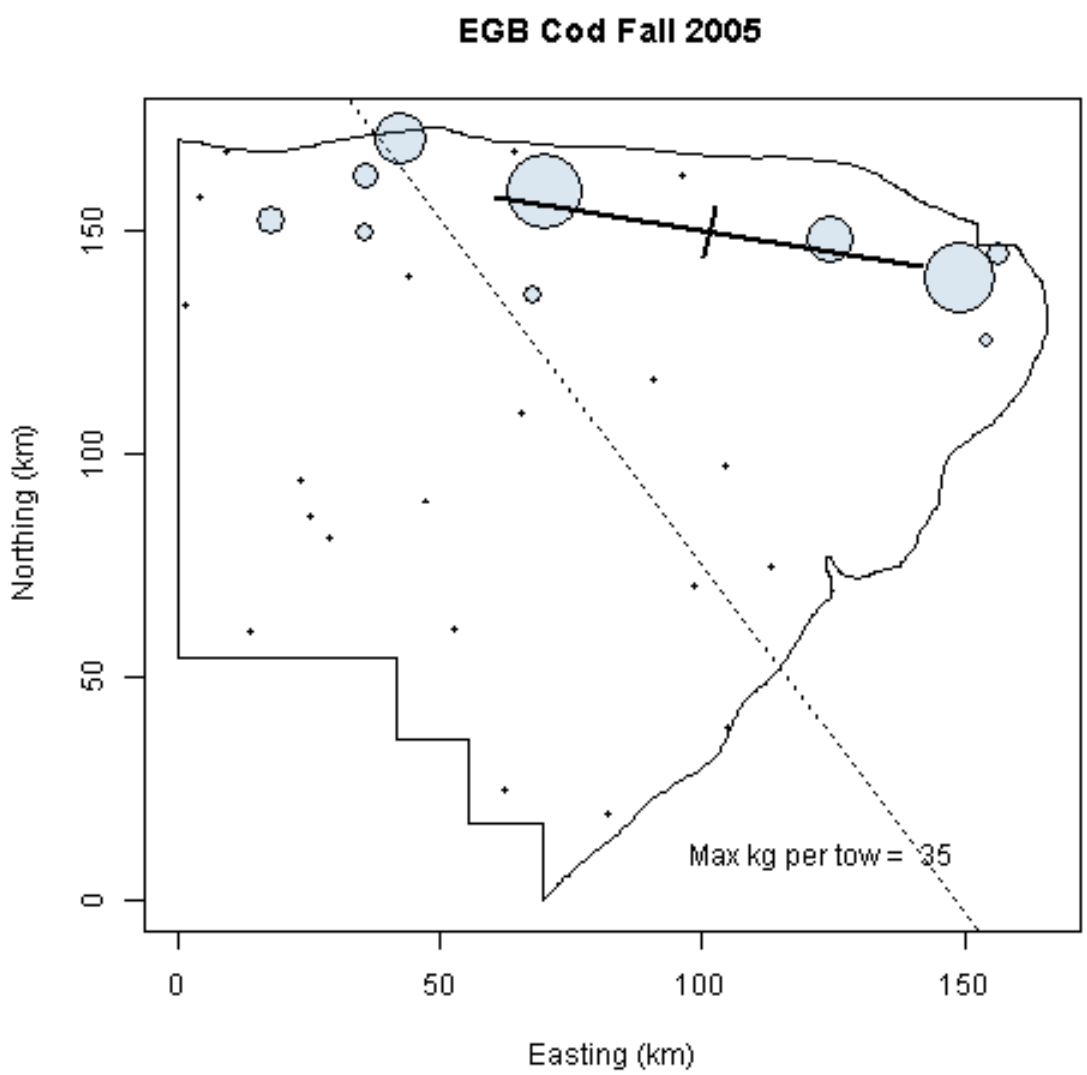

EGB Cod Fall 2000
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 16

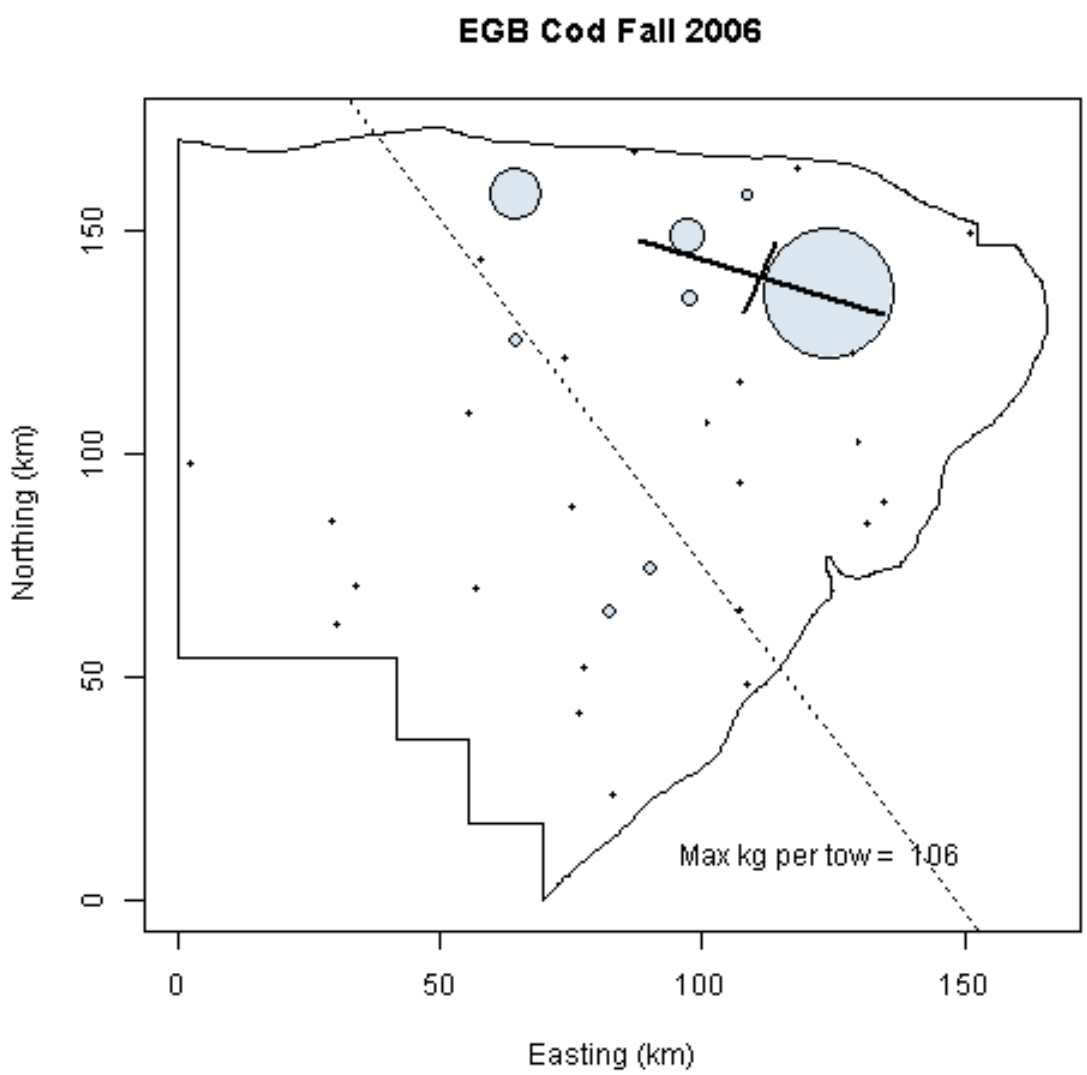

EGB Cod Fall 2001
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 43

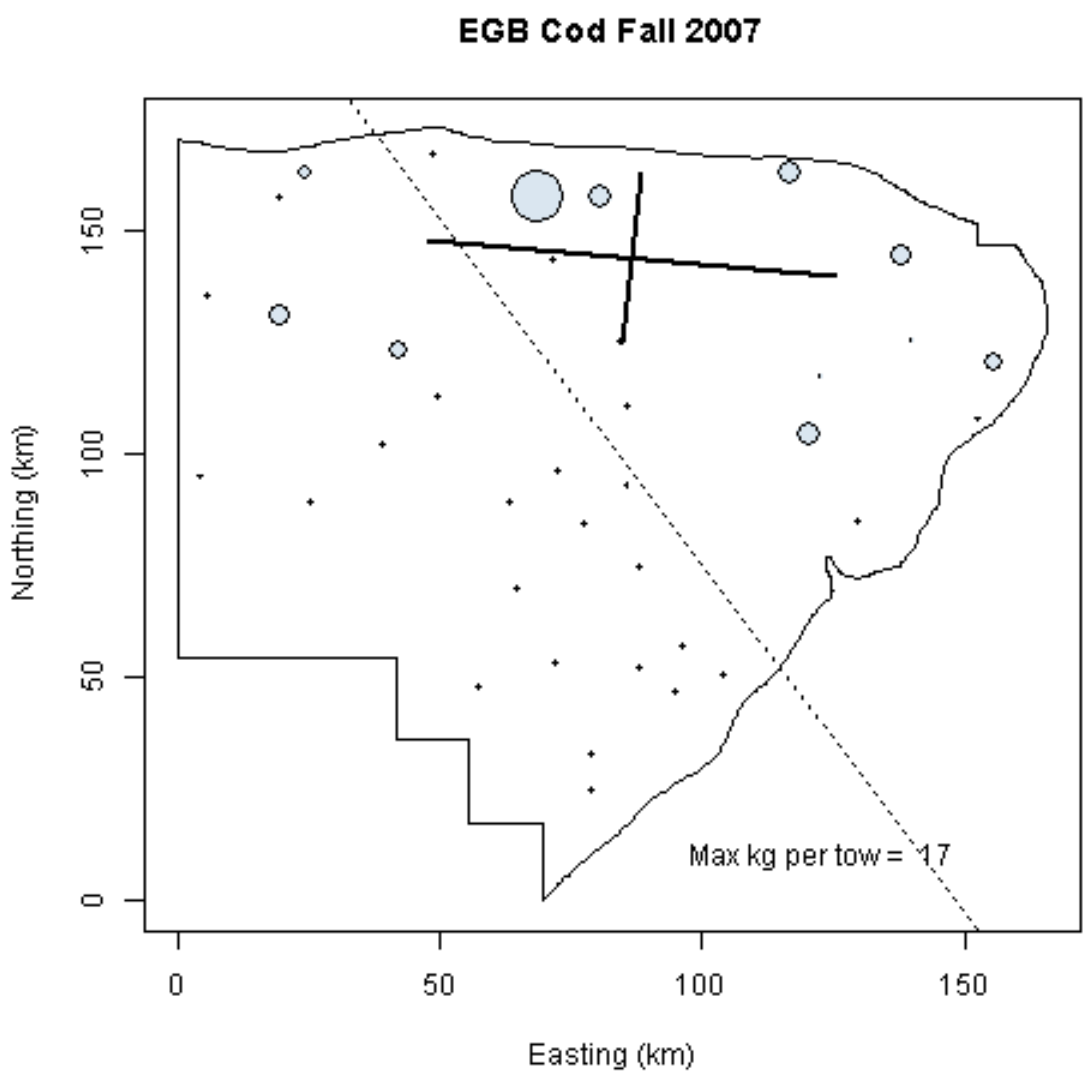

EGB Cod Fall 2002
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 678

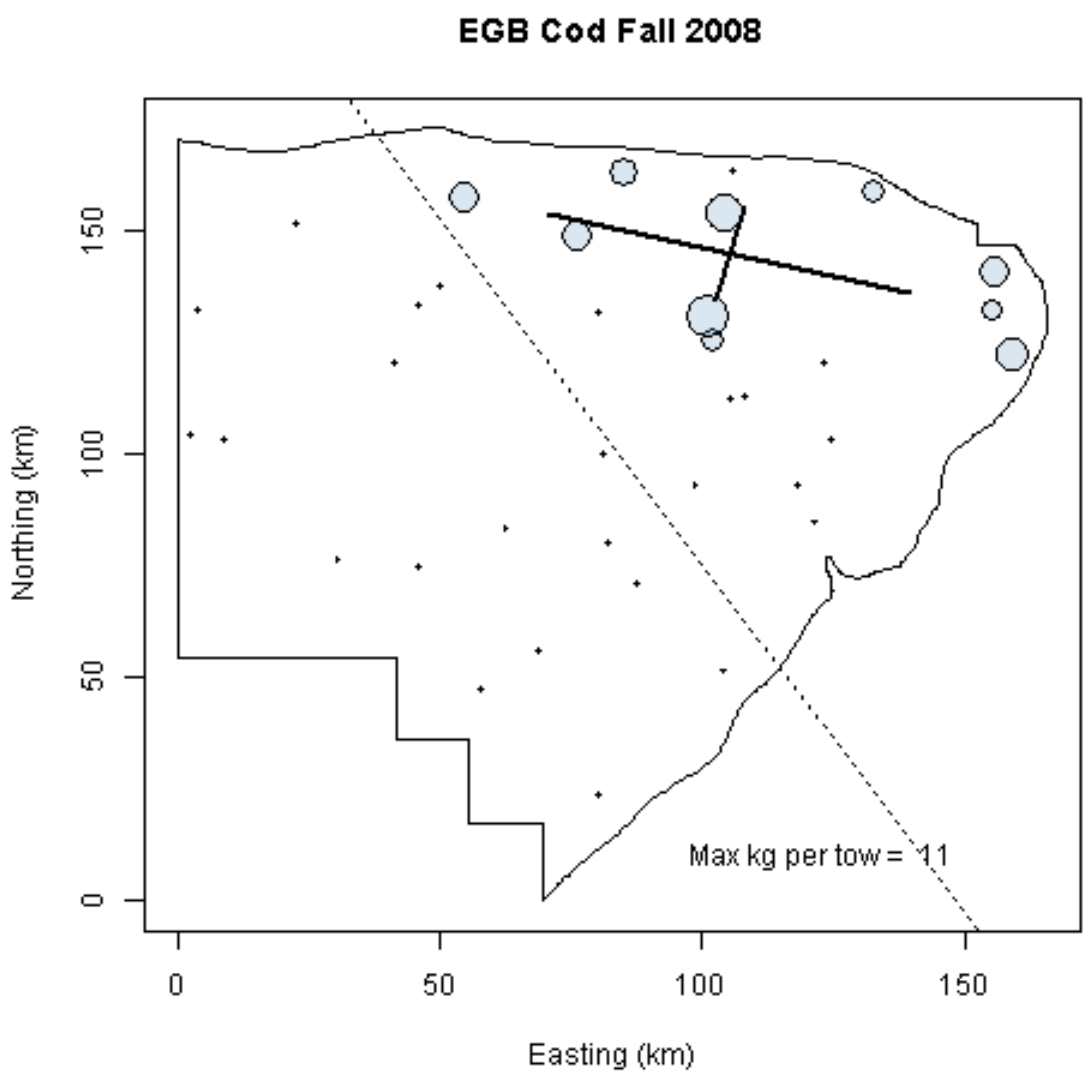

EGB Cod Fall 2003
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 41

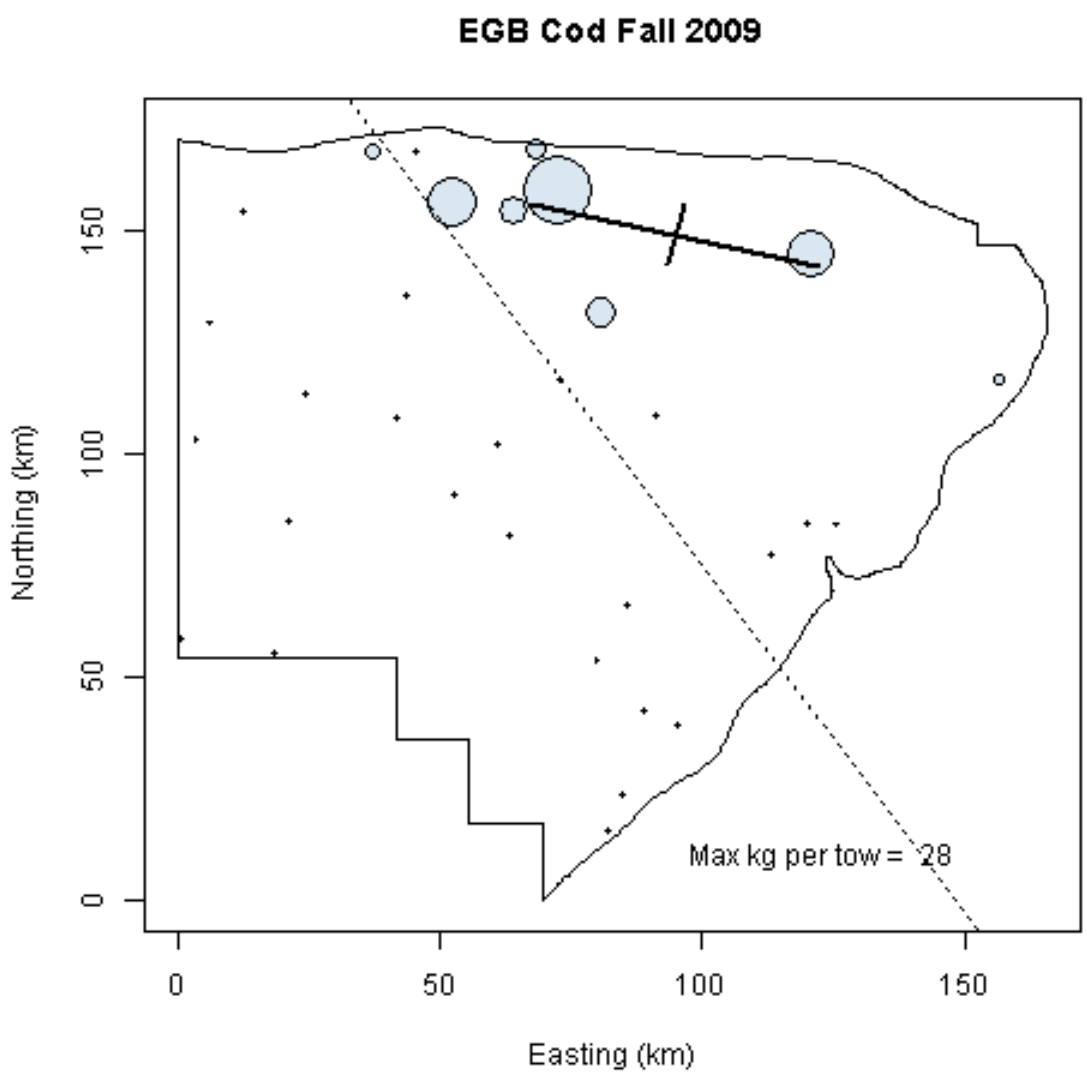

EGB Cod Fall 2004
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 213

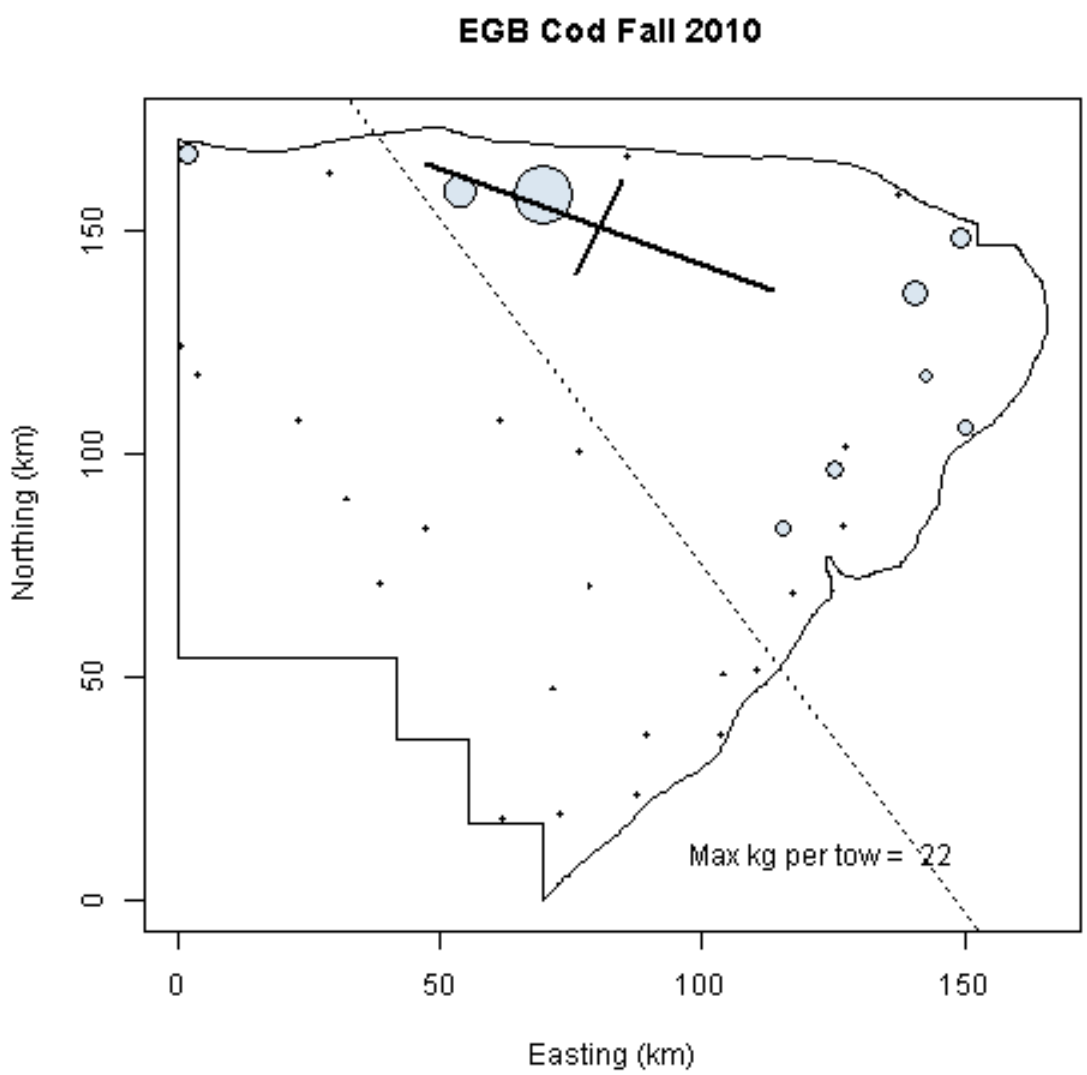

EGB Cod Fall 2005
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 35

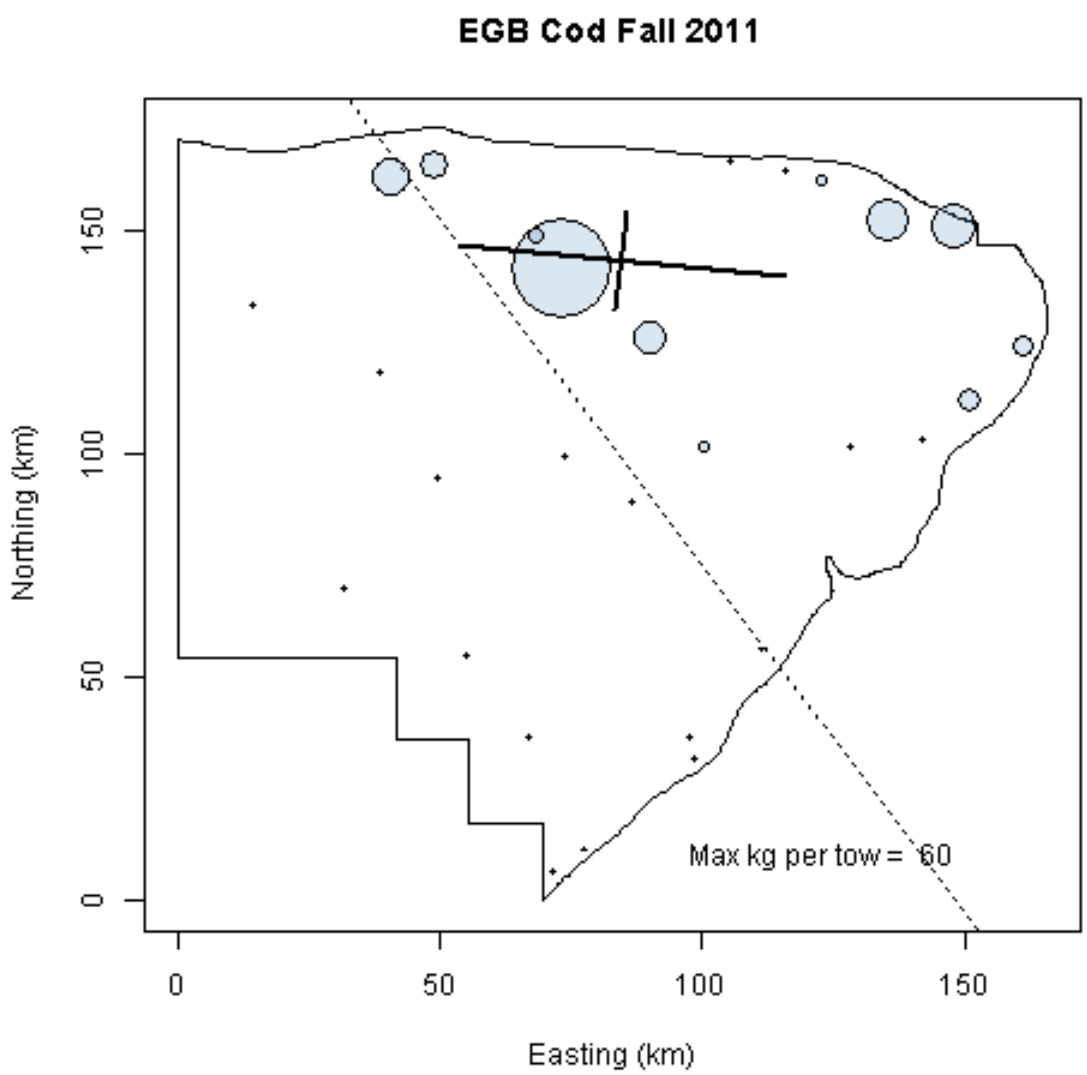

EGB Cod Fall 2006
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 106

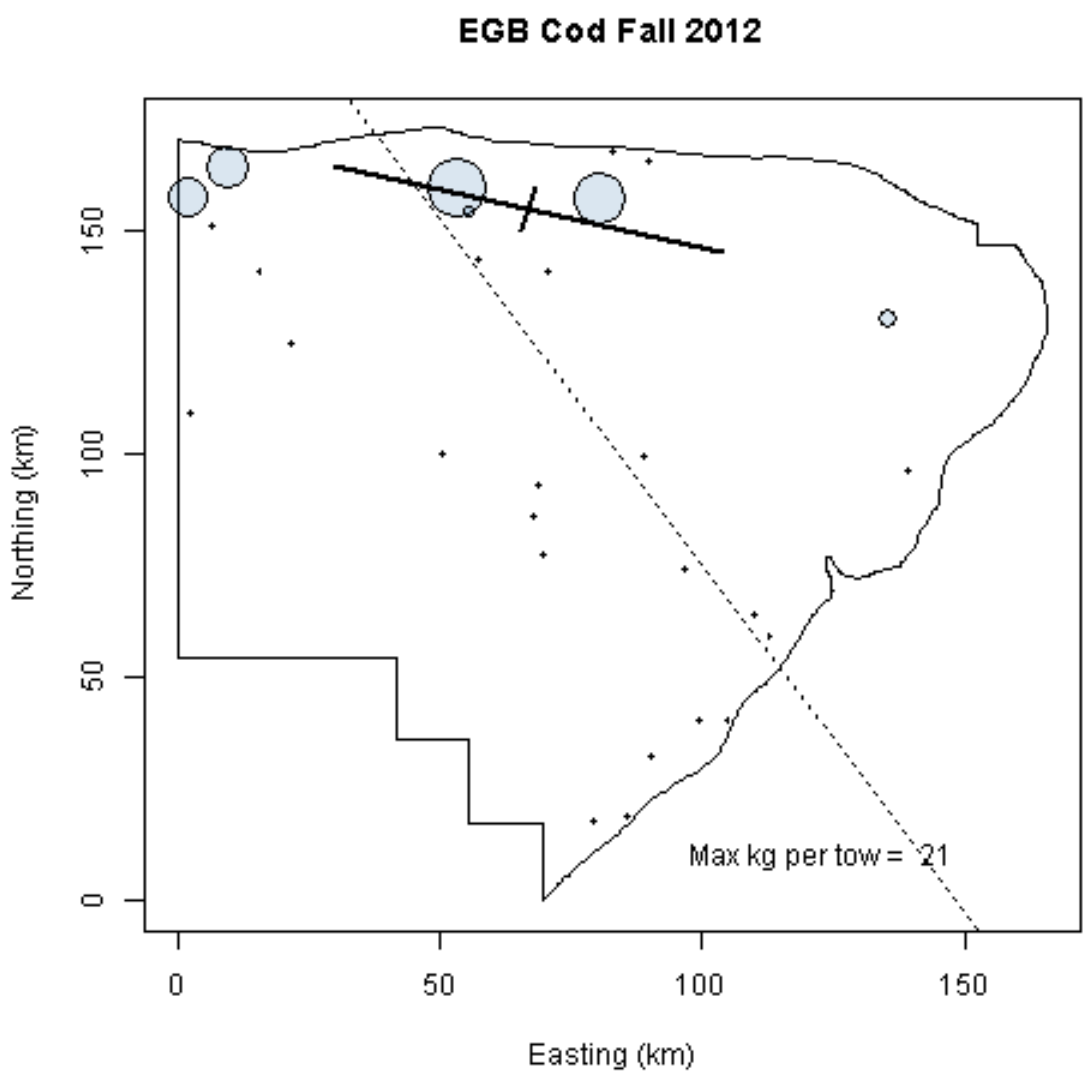

EGB Cod Fall 2007
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 17

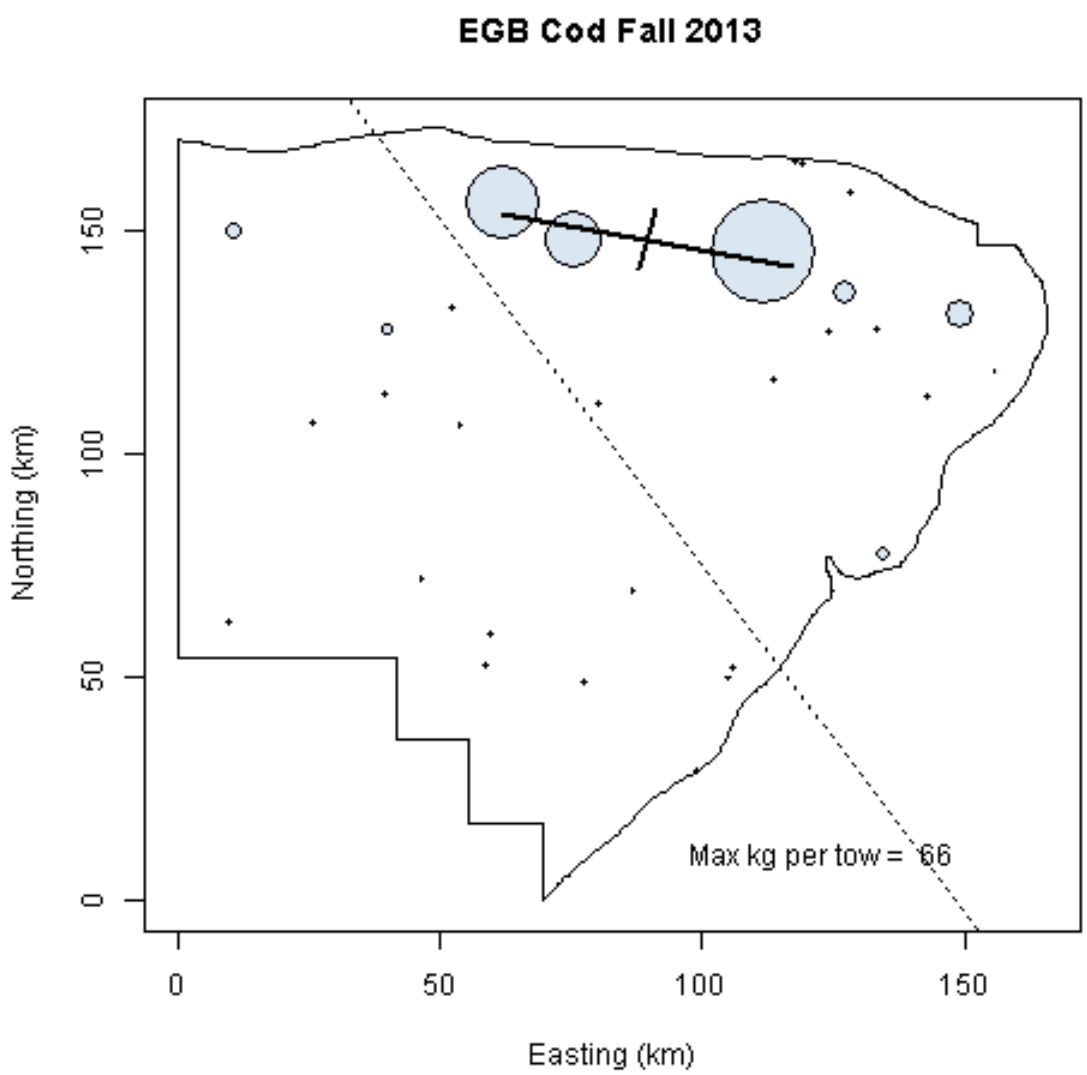

EGB Cod Fall 2008
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 11

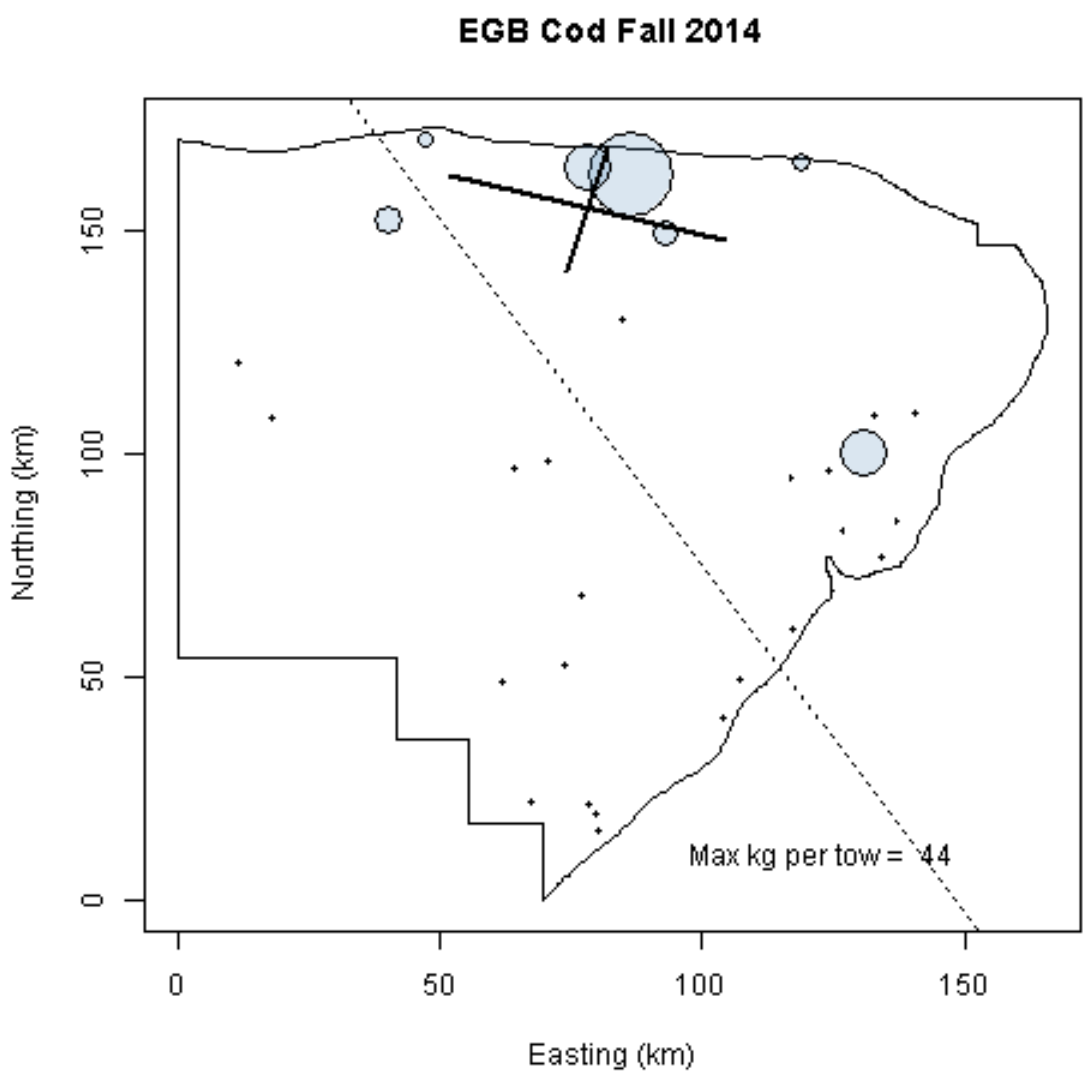

EGB Cod Fall 2009
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 28

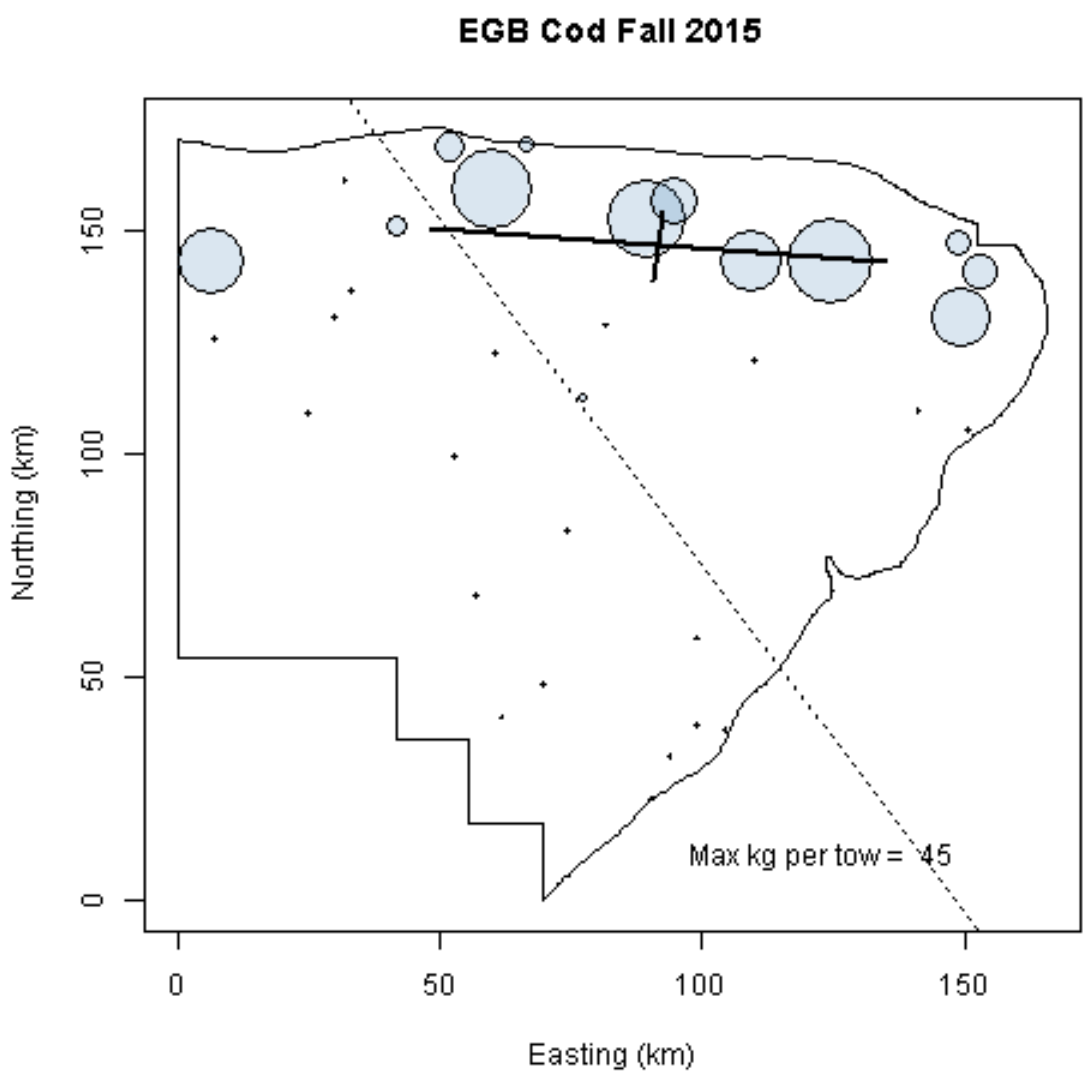

EGB Cod Fall 2010
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 22

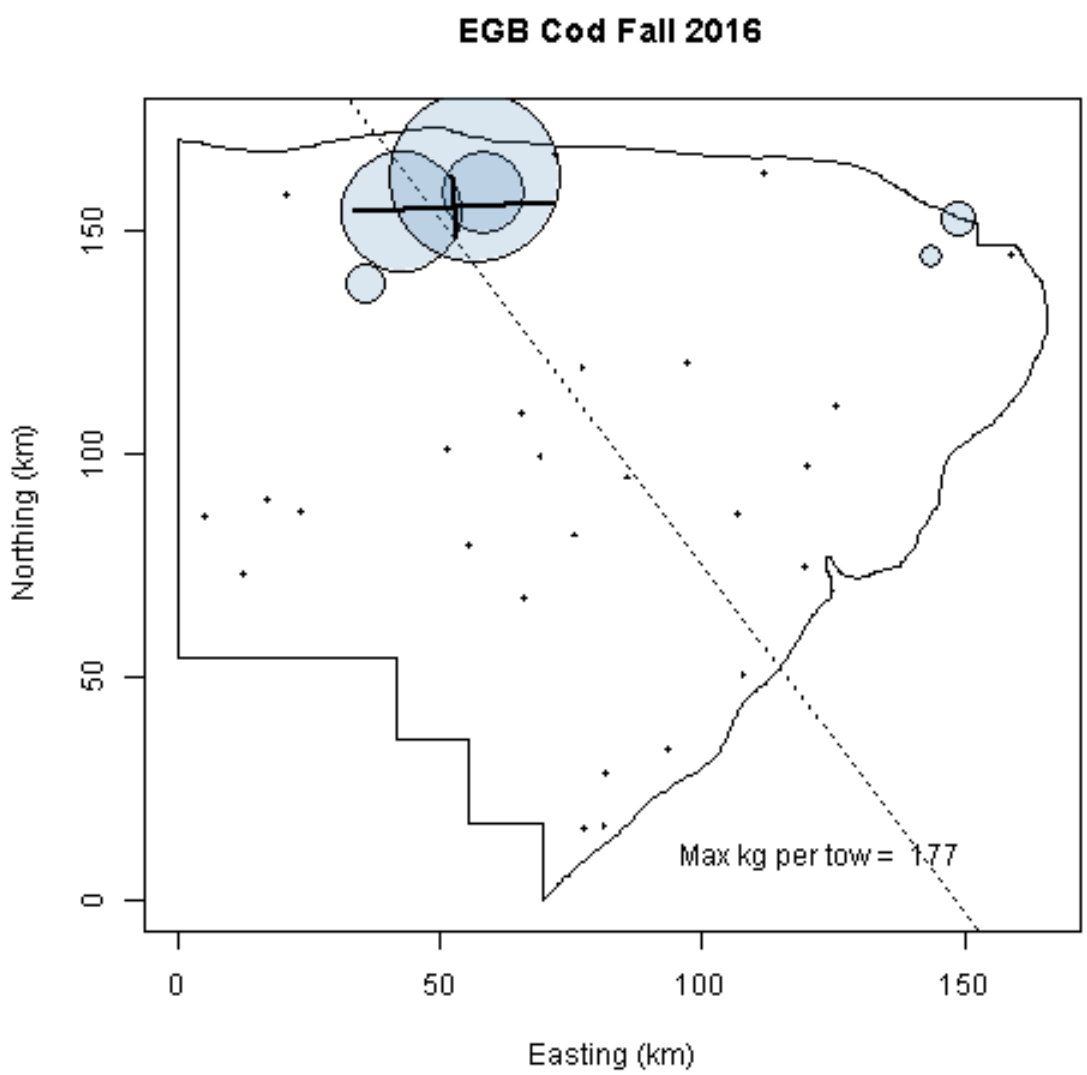

EGB Cod Fall 2011
Northing (km)
Easting (km)
0
50
100
150
Max kg per tow = 60

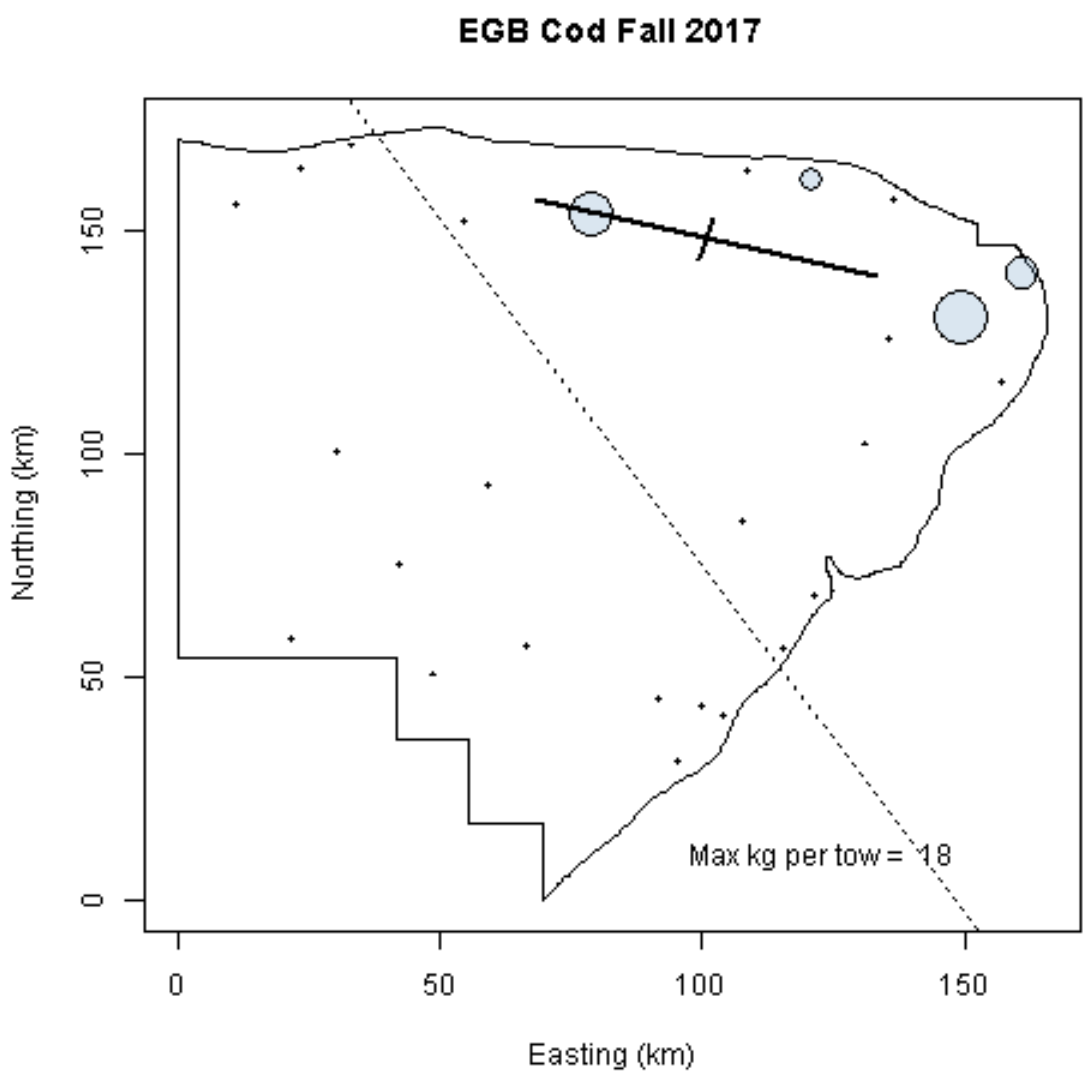

EGB Cod Fall 2012
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 21


EGB Cod Fall 2013
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 66

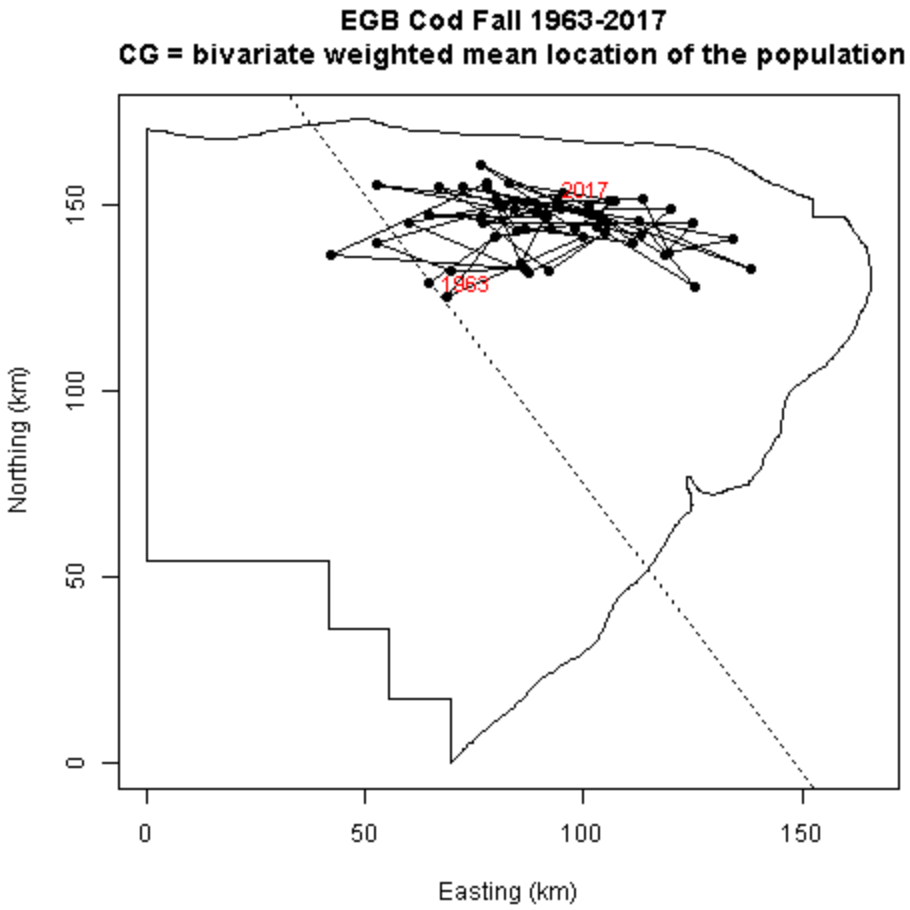

EGB Cod Fall 2014
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 44


EGB Cod Fall 2015
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 45

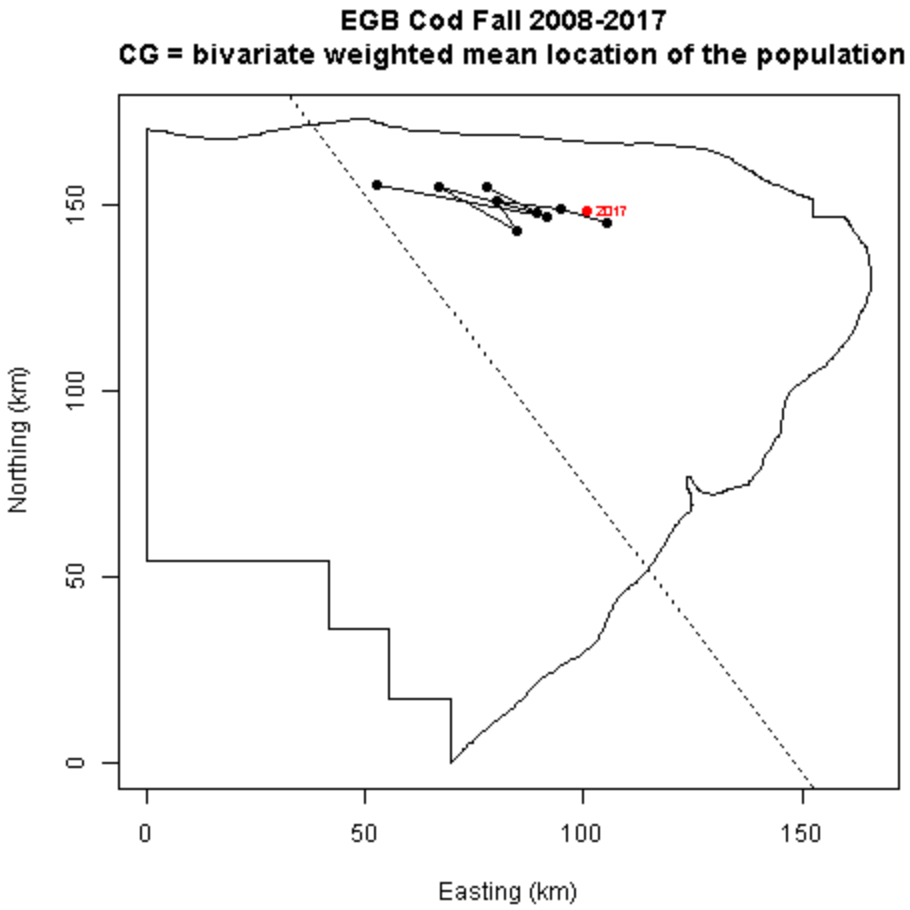

EGB Cod Fall 2016
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 177

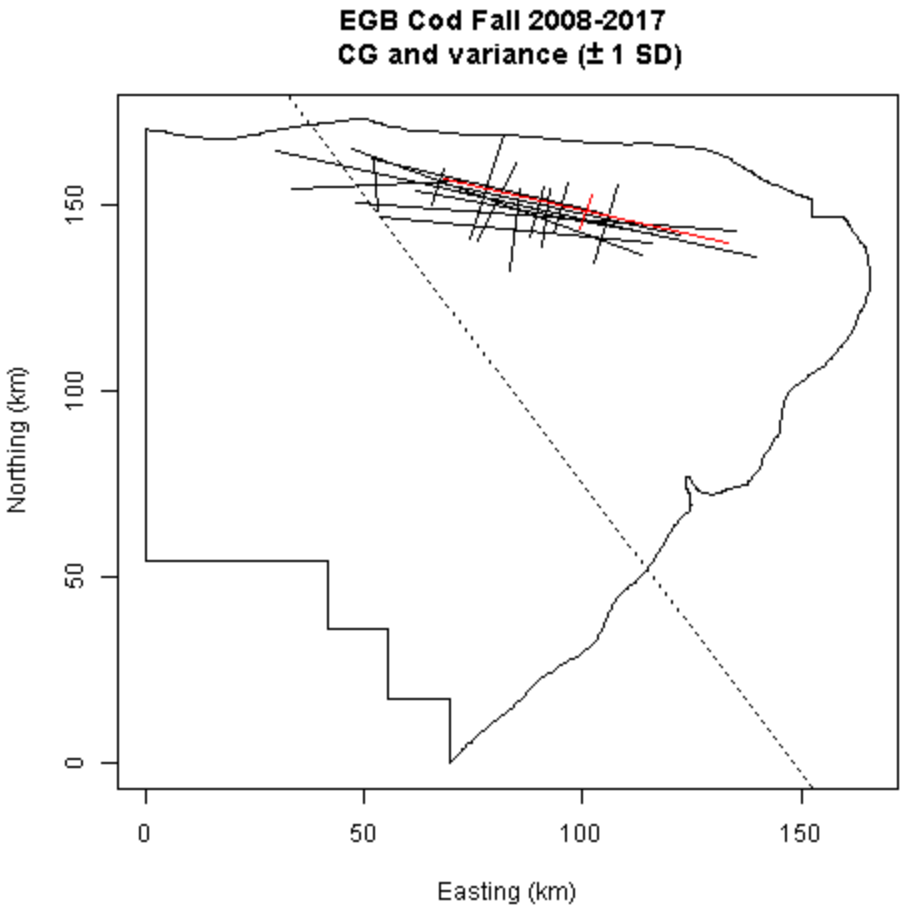

EGB Cod Fall 2017
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 18

Results: EGB Cod

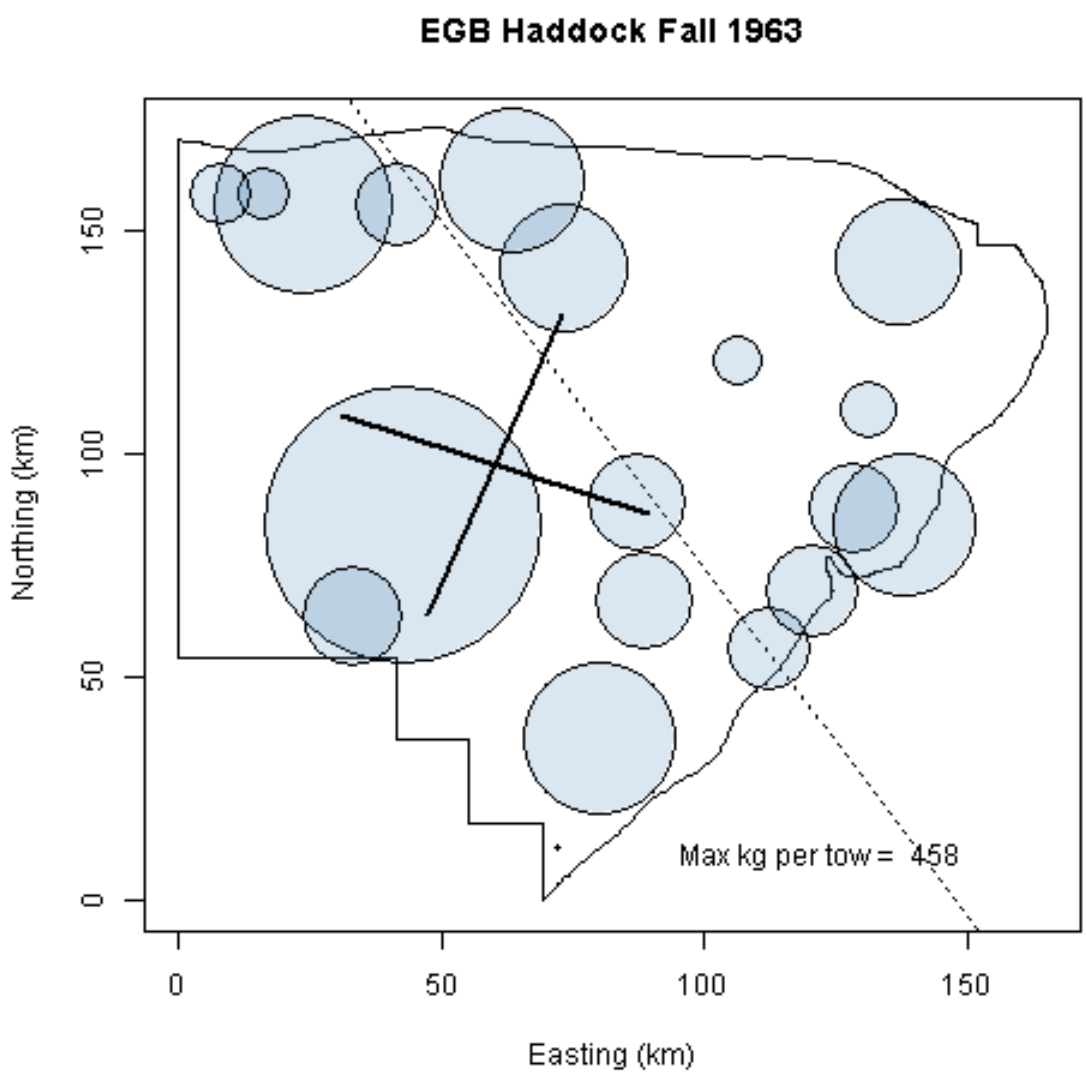


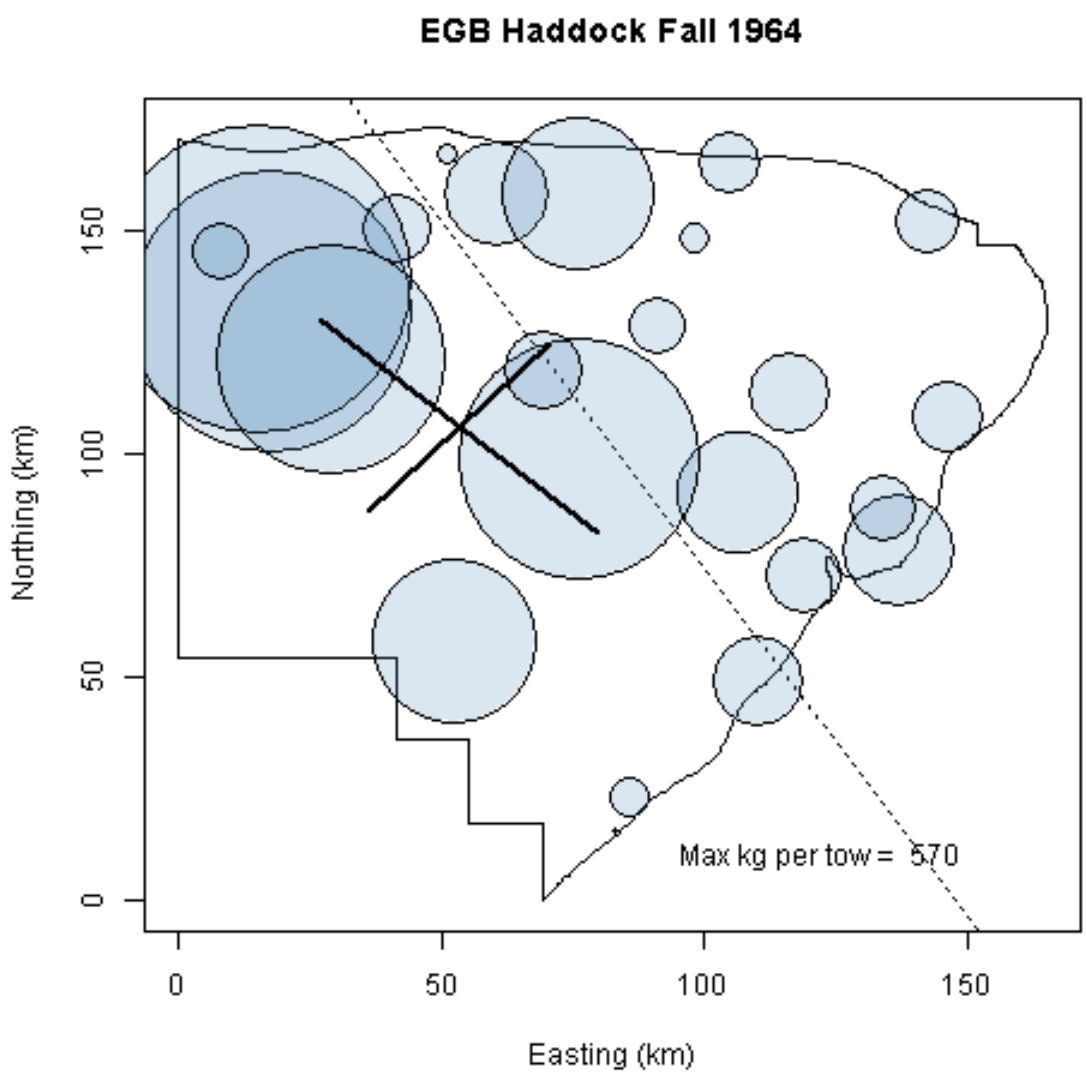
Results: EGB Cod

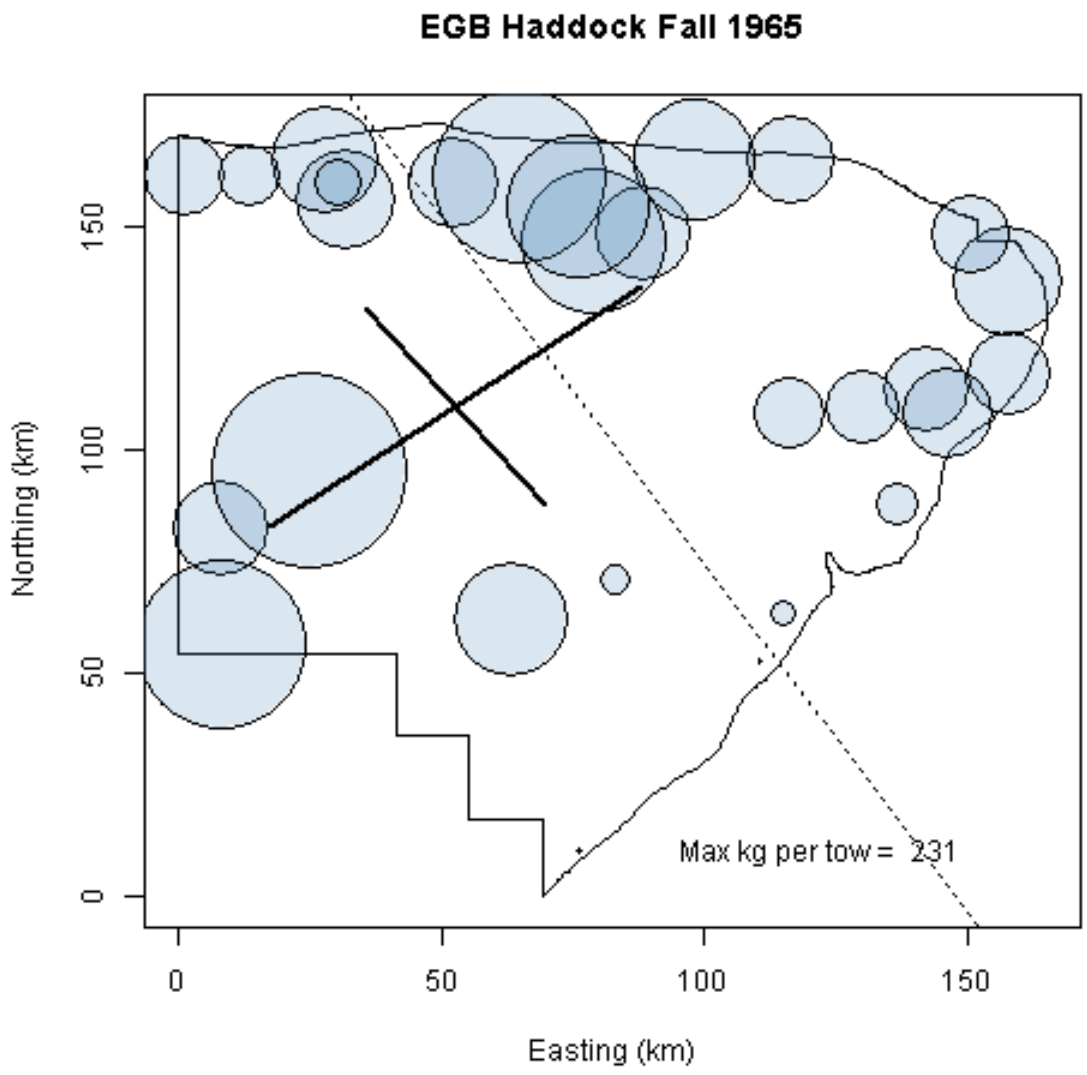


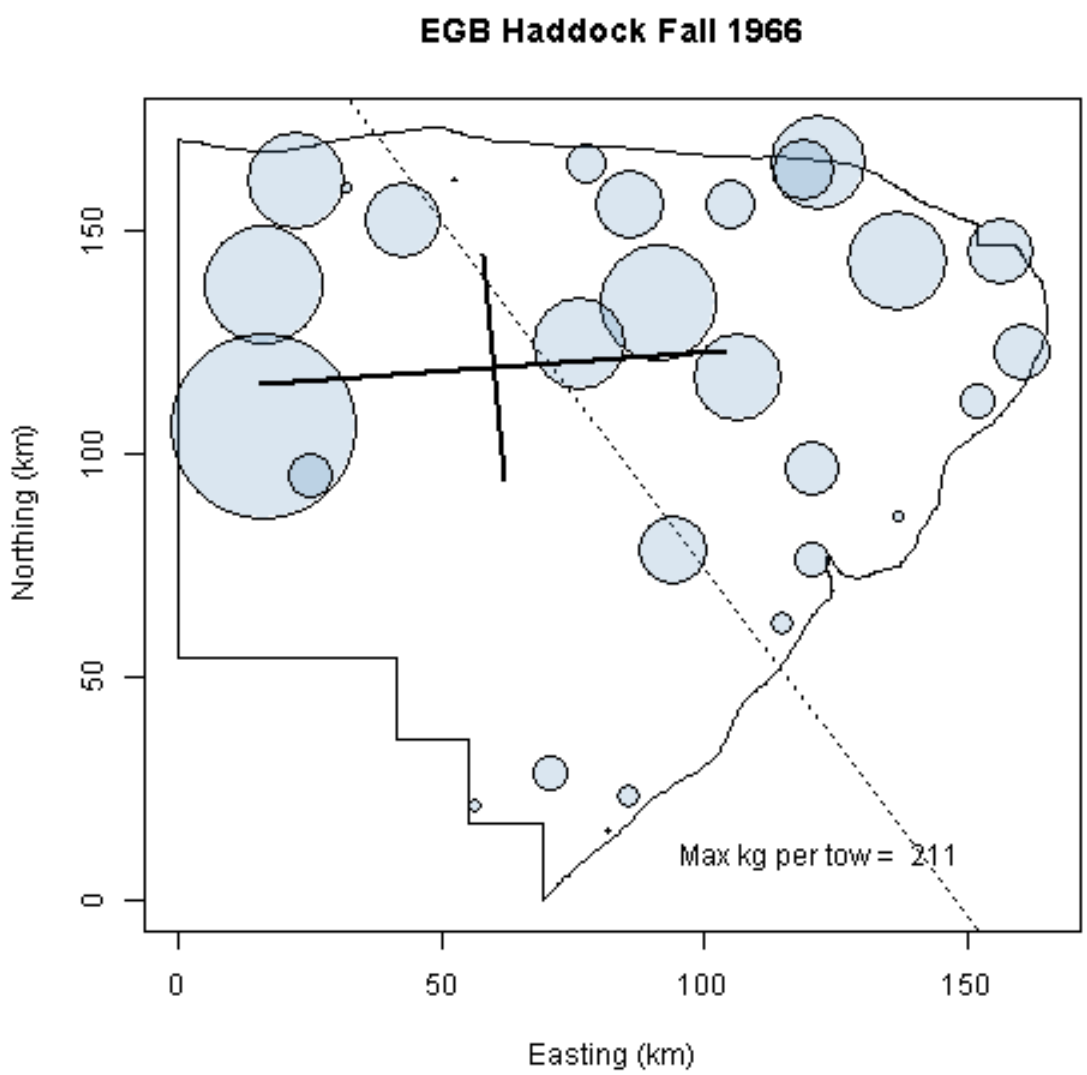


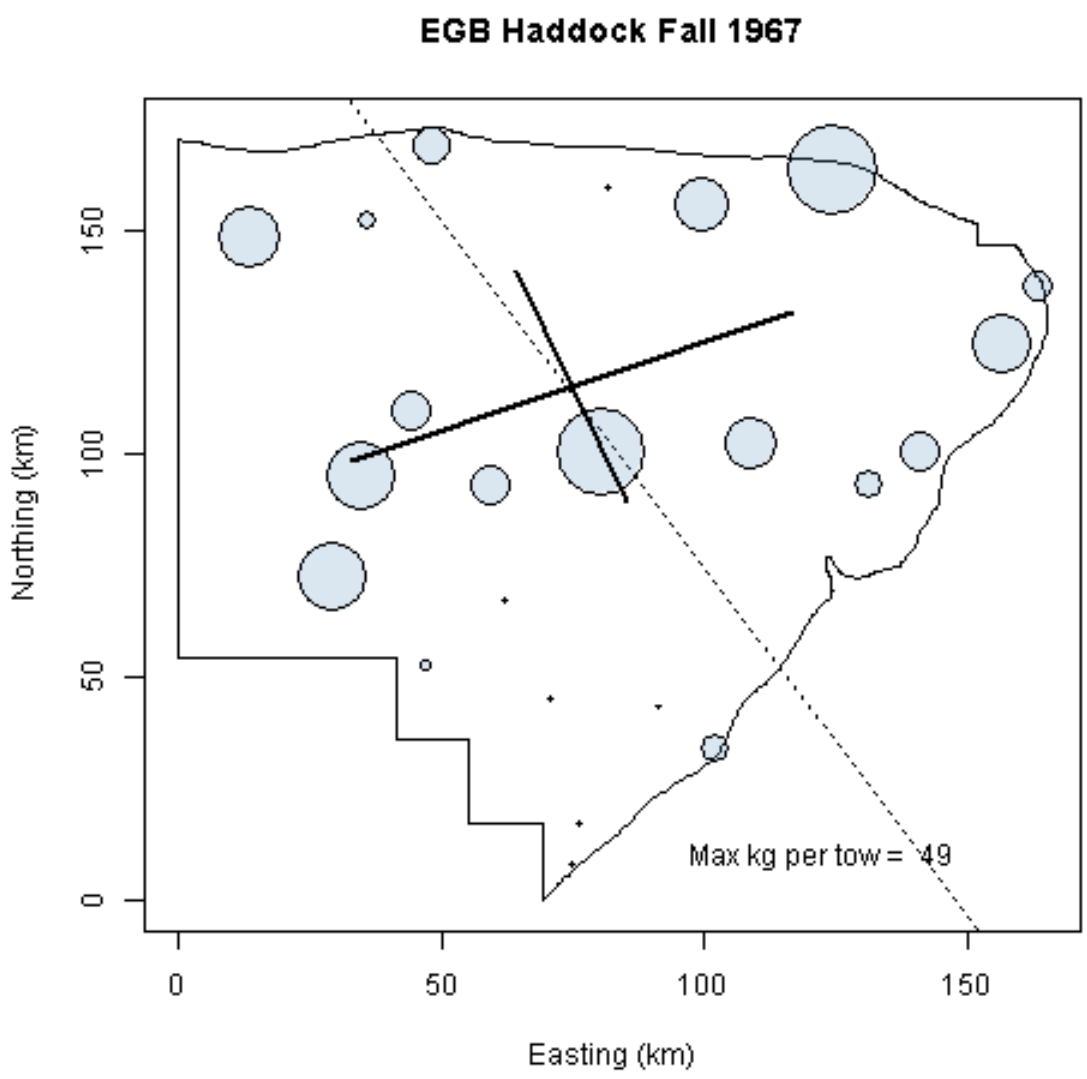
CG Maps: EGB Haddock

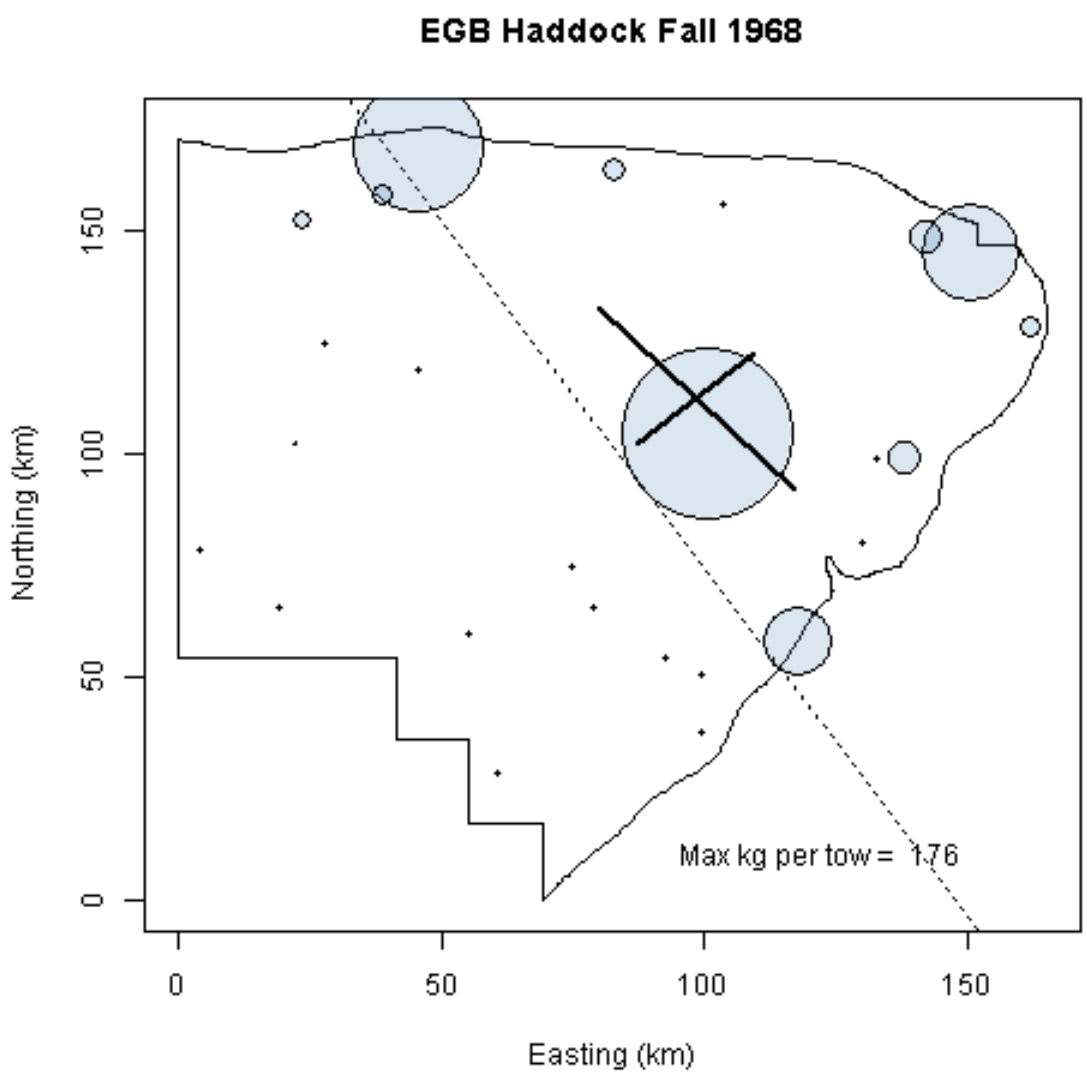

EGB Haddock Fall 1963
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 458

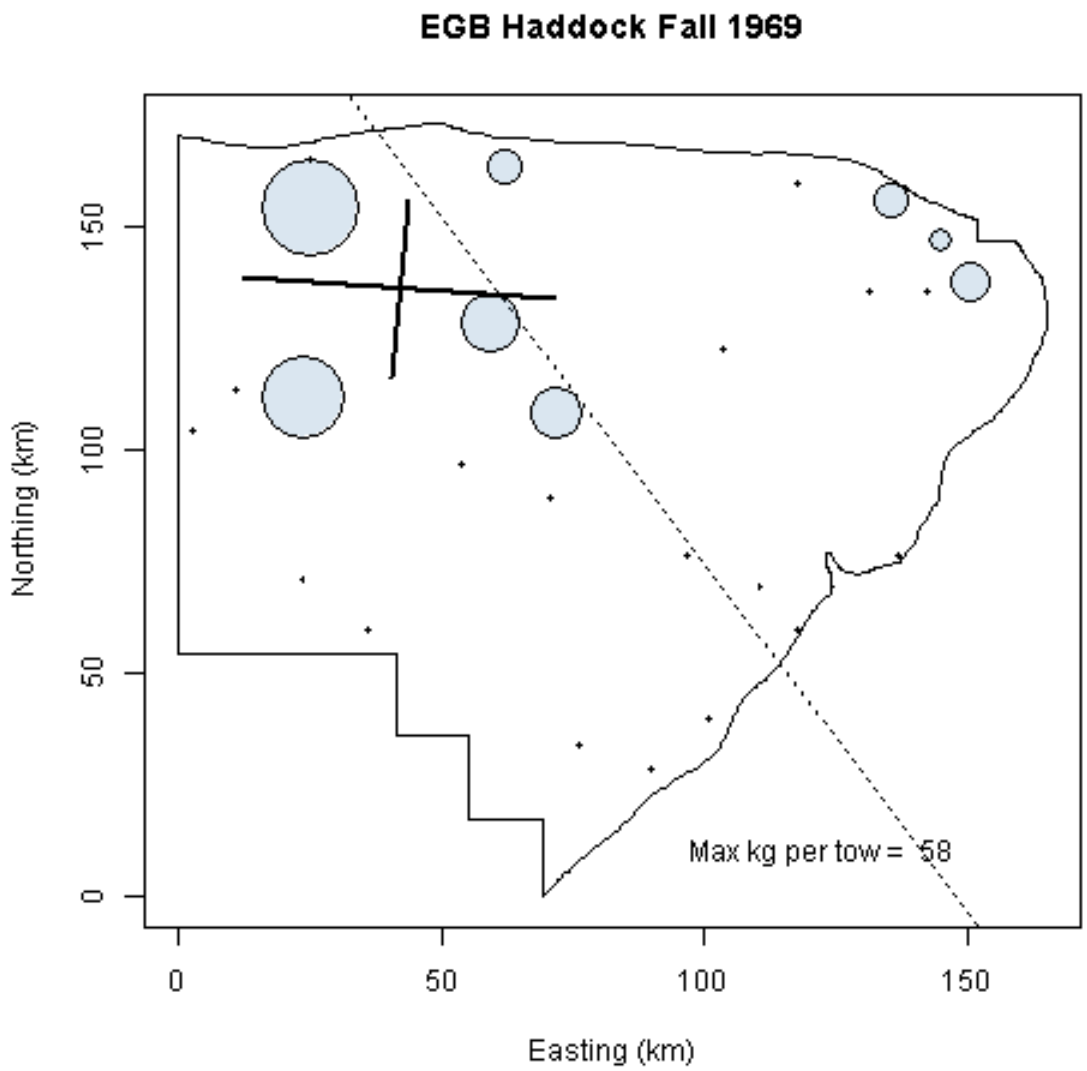

EGB Haddock Fall 1964
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 570

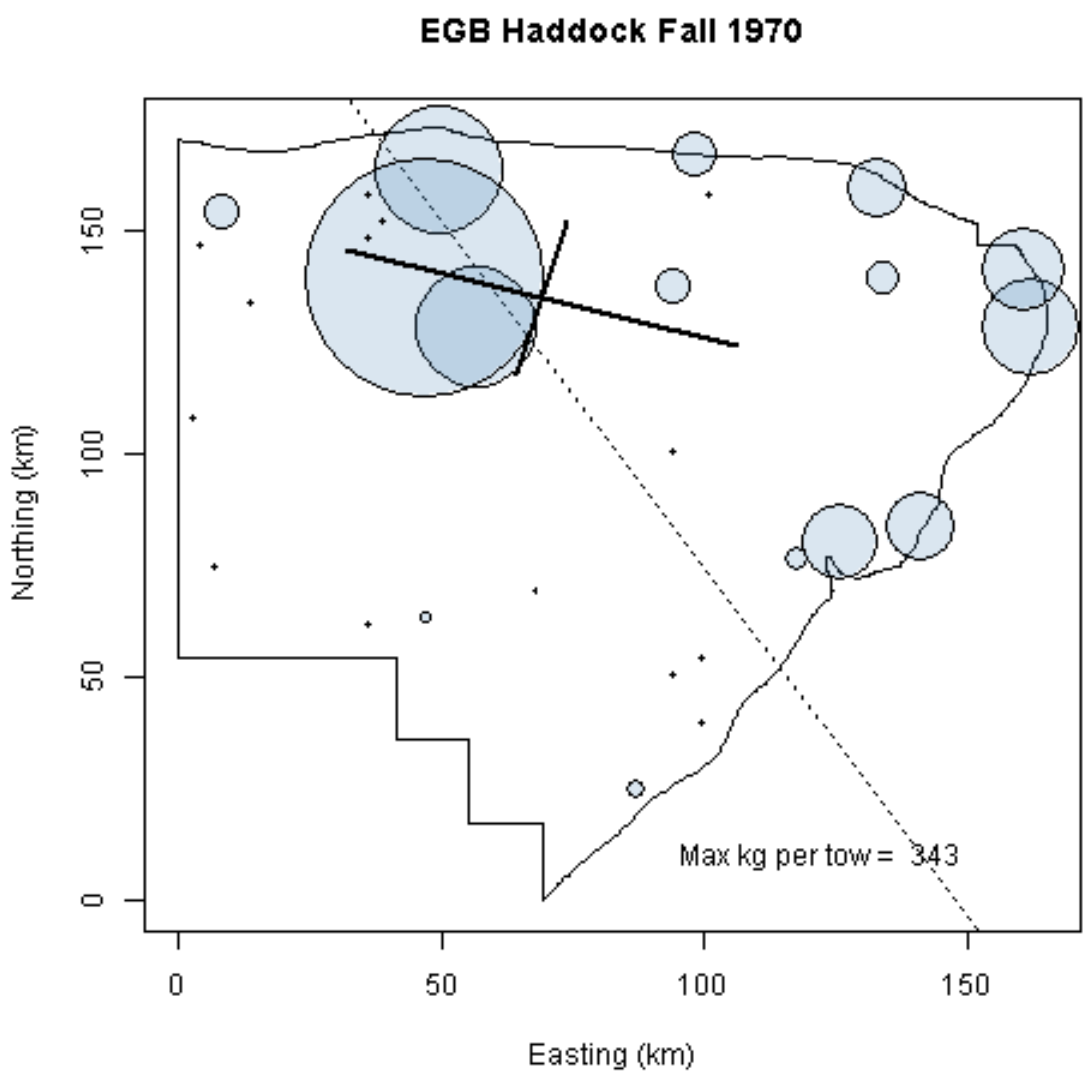

EGB Haddock Fall 1965
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 231

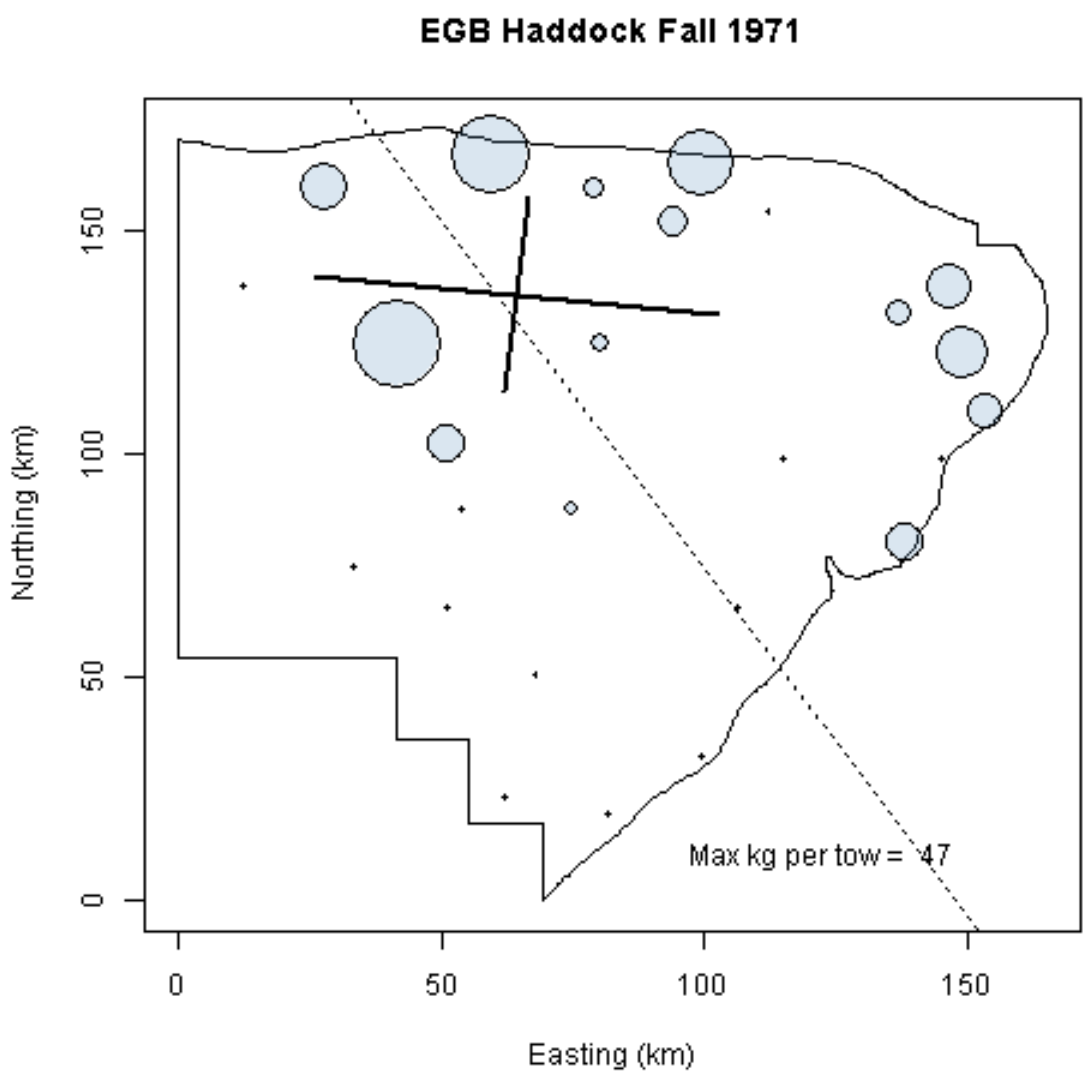

EGB Haddock Fall 1966
Northing (km)
Easting (km)
0
50
100
150
Max kg per tow = 211

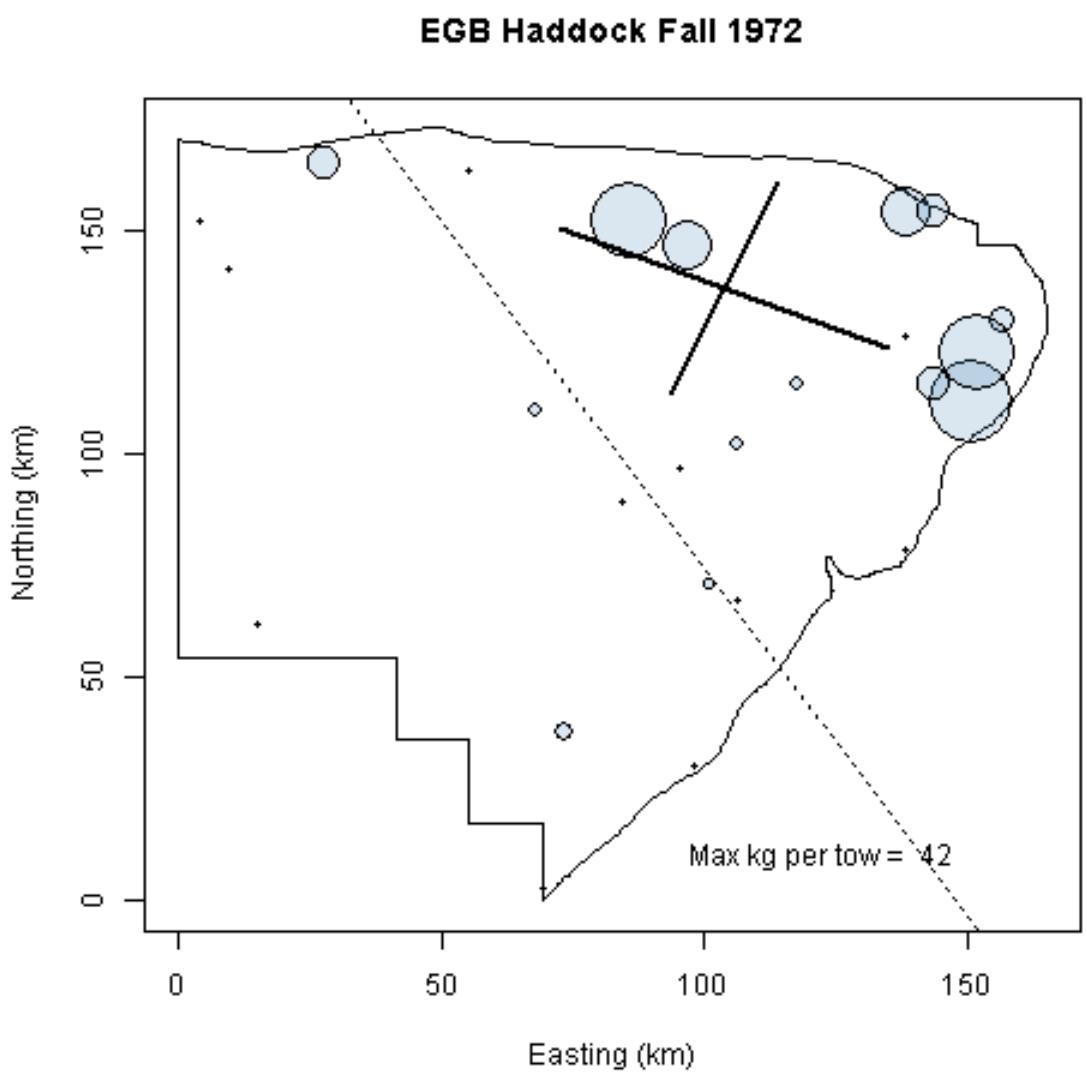

EGB Haddock Fall 1967
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 49

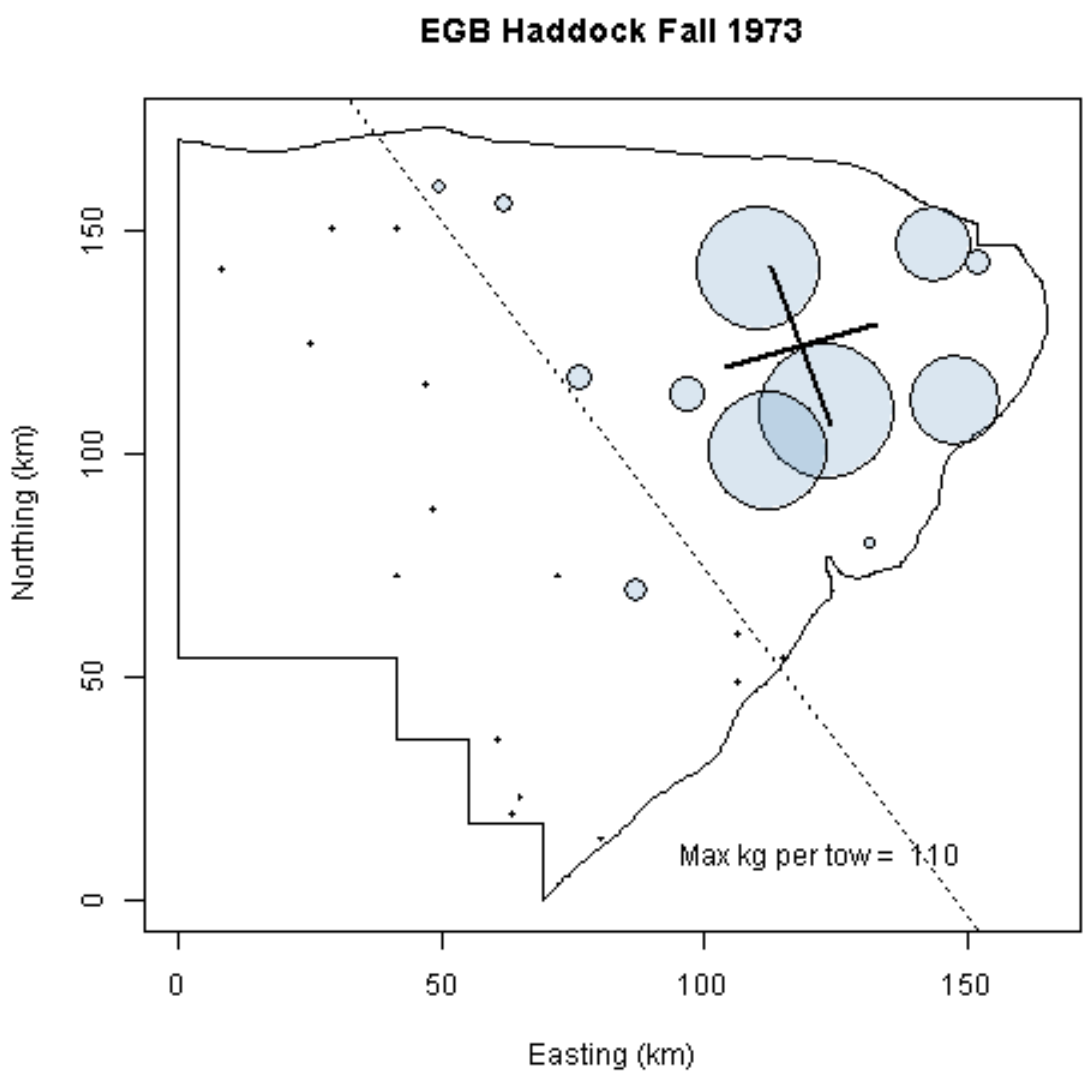

EGB Haddock Fall 1968
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 176

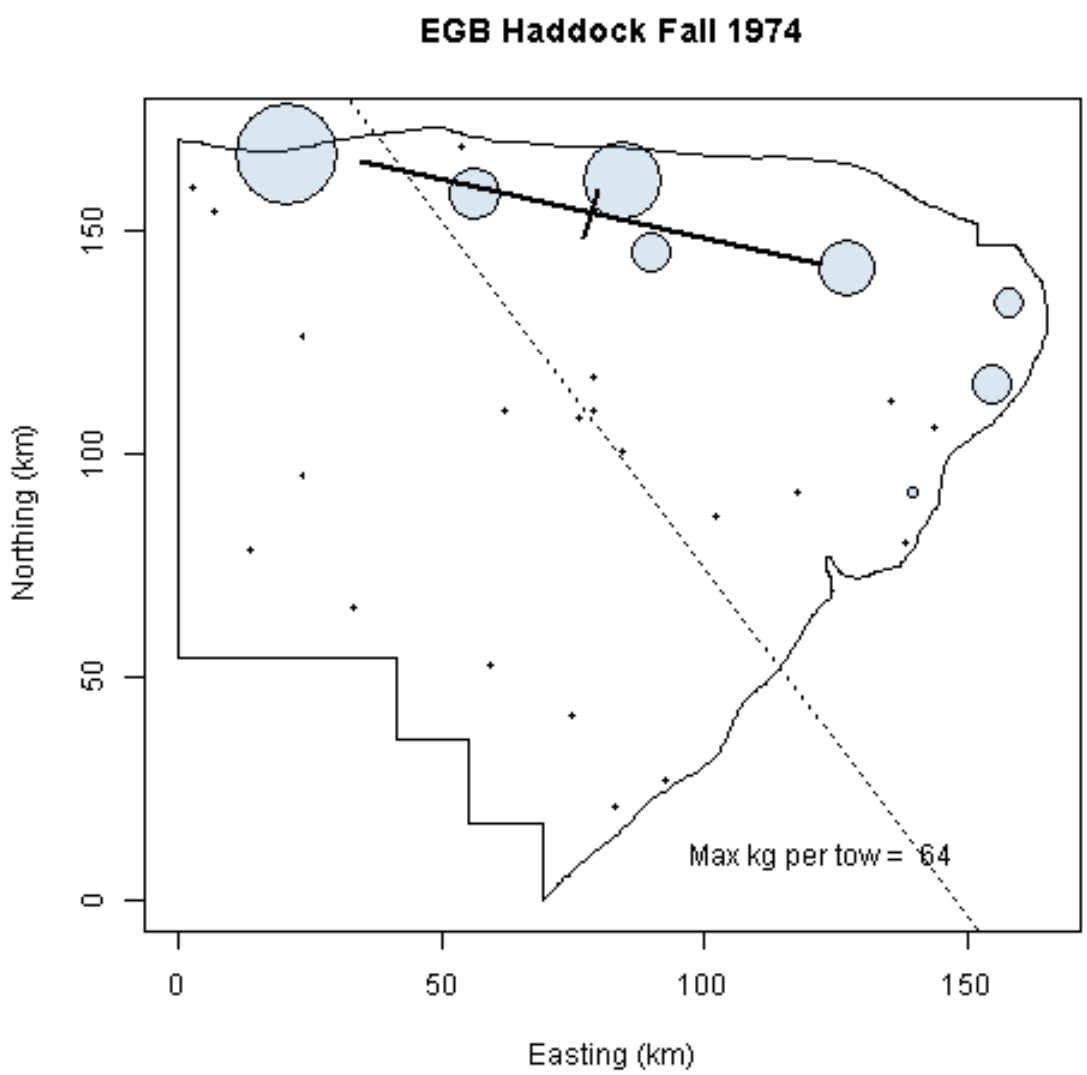

EGB Haddock Fall 1969
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 58

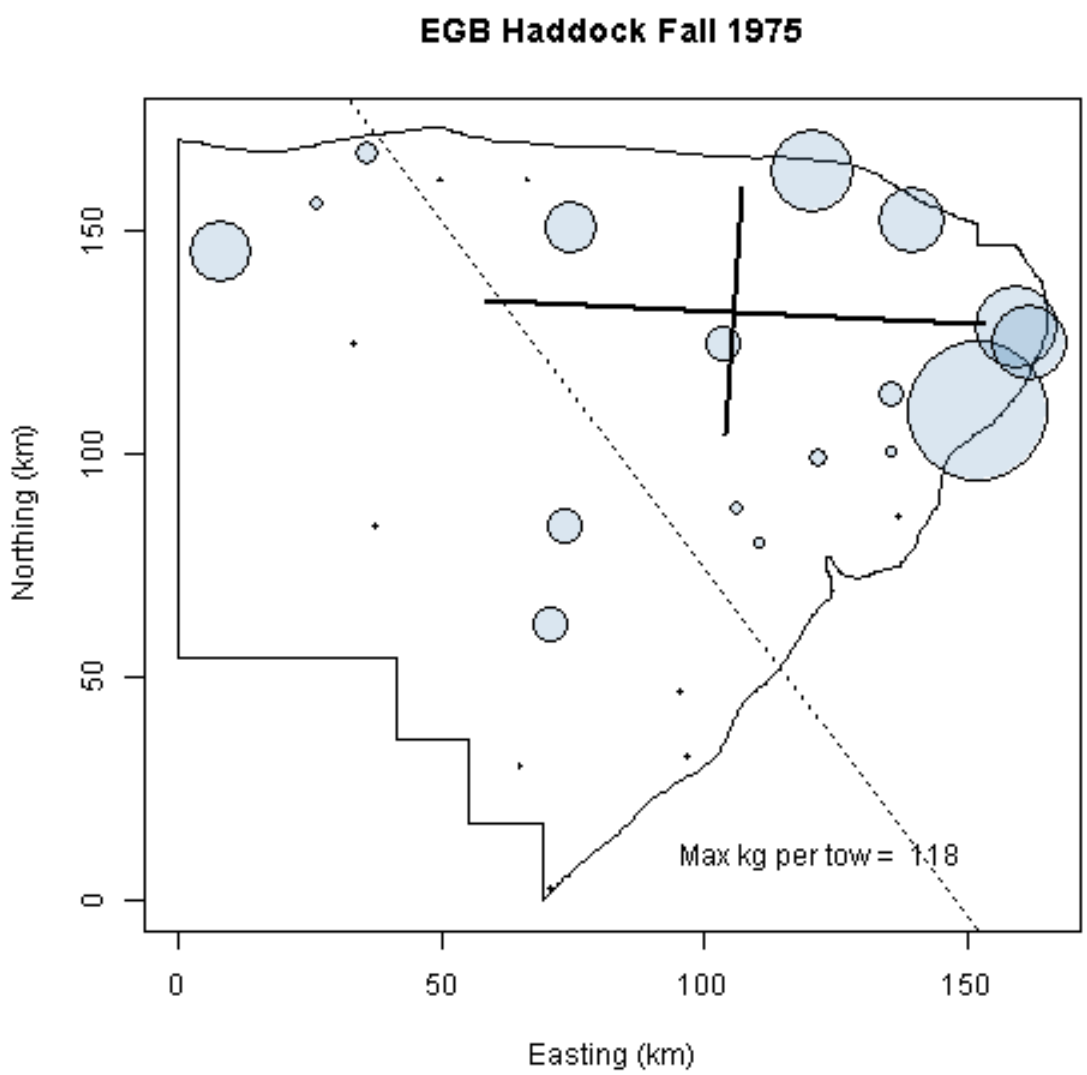

EGB Haddock Fall 1970
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 343

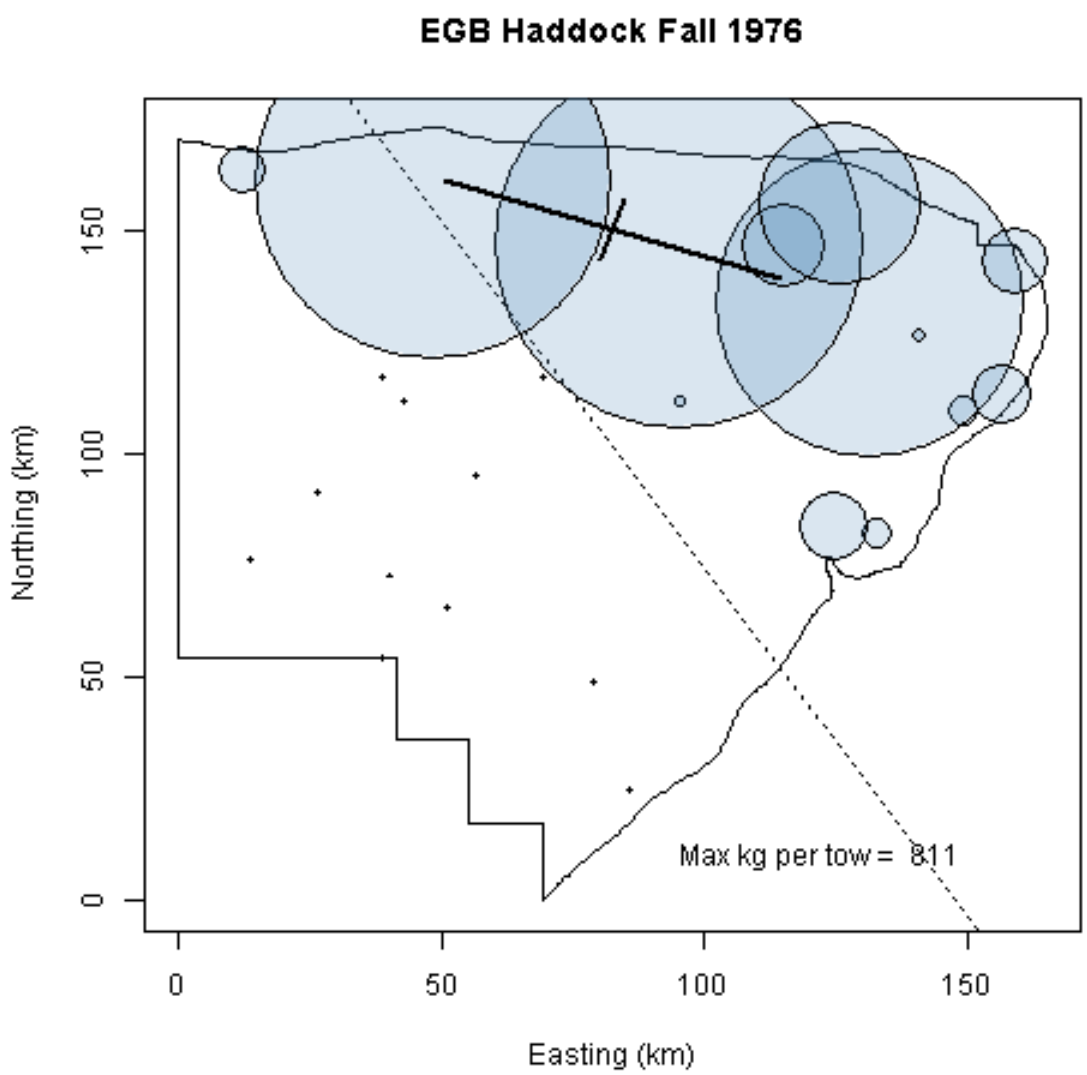

EGB Haddock Fall 1971
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 47

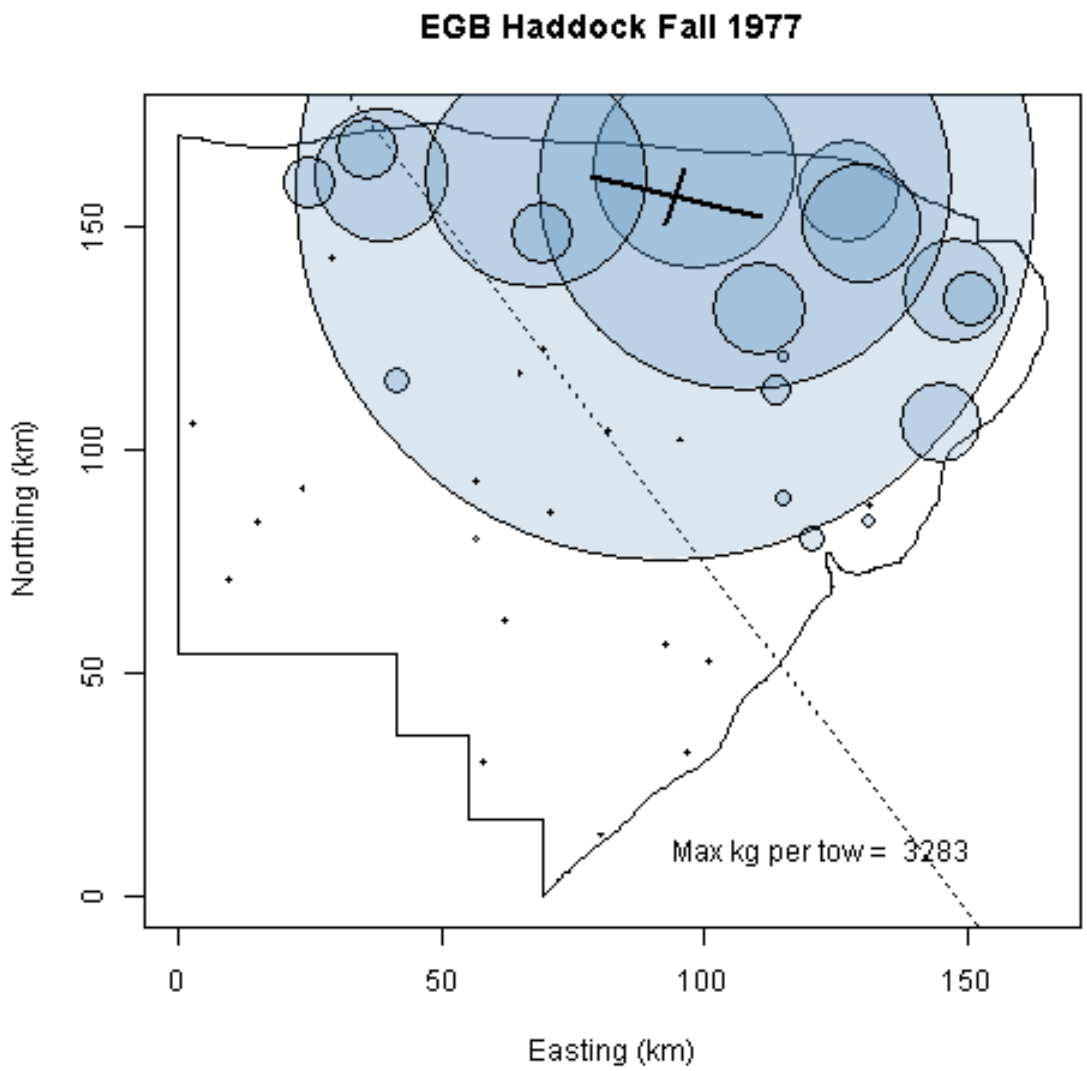

EGB Haddock Fall 1972
Northing (km)
Easting (km)
0
50
100
150
Max kg per tow = 42

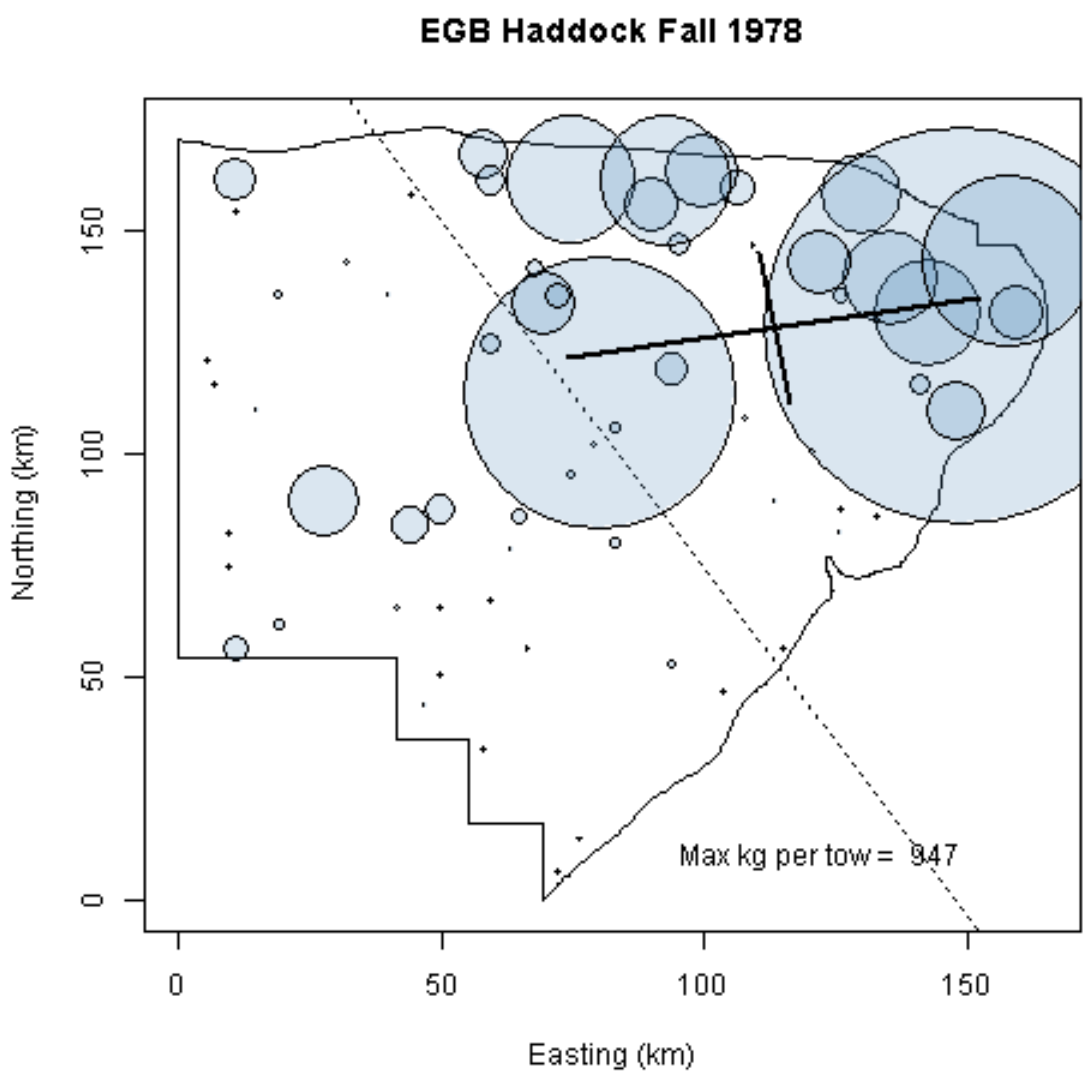

EGB Haddock Fall 1973
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 110

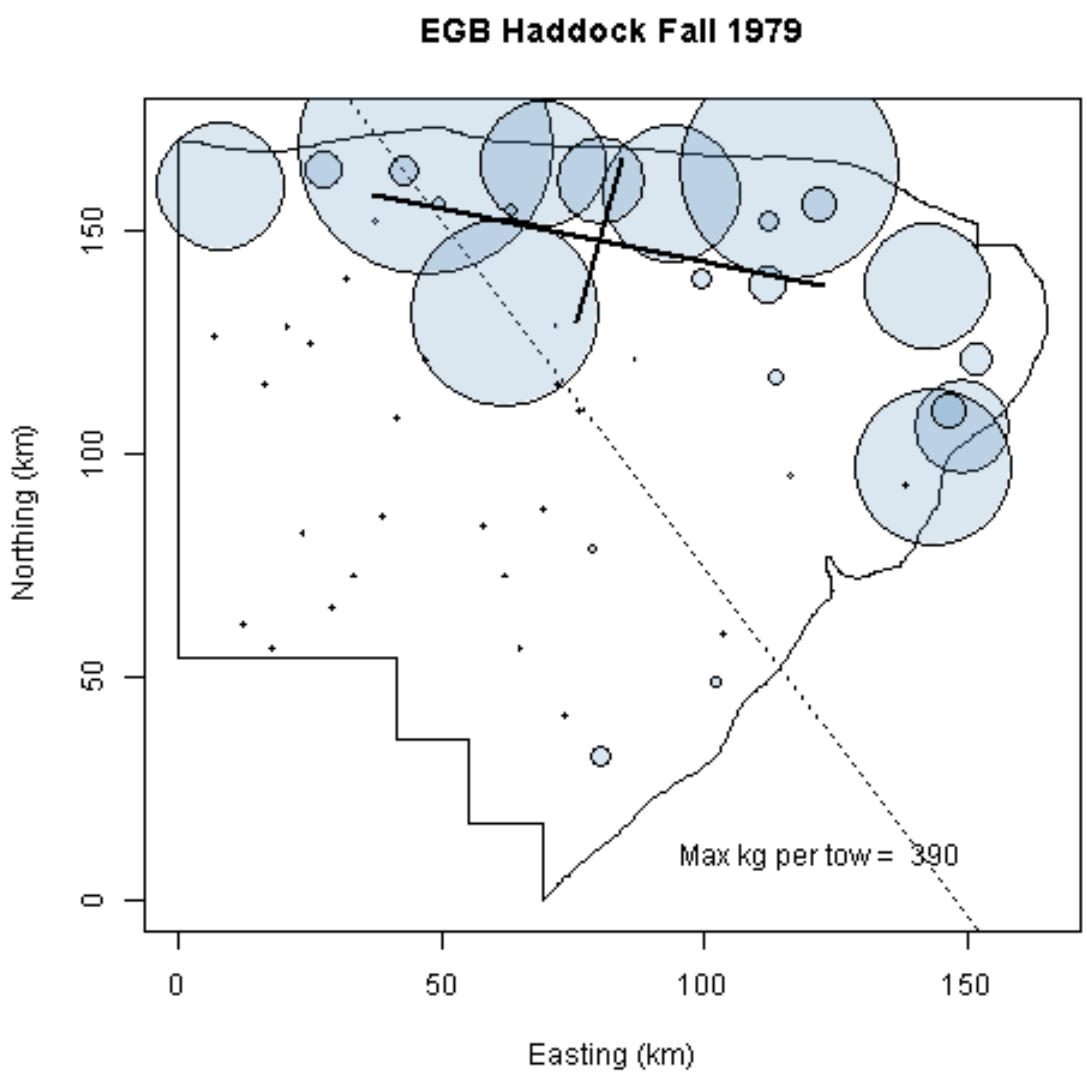

EGB Haddock Fall 1974
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 64

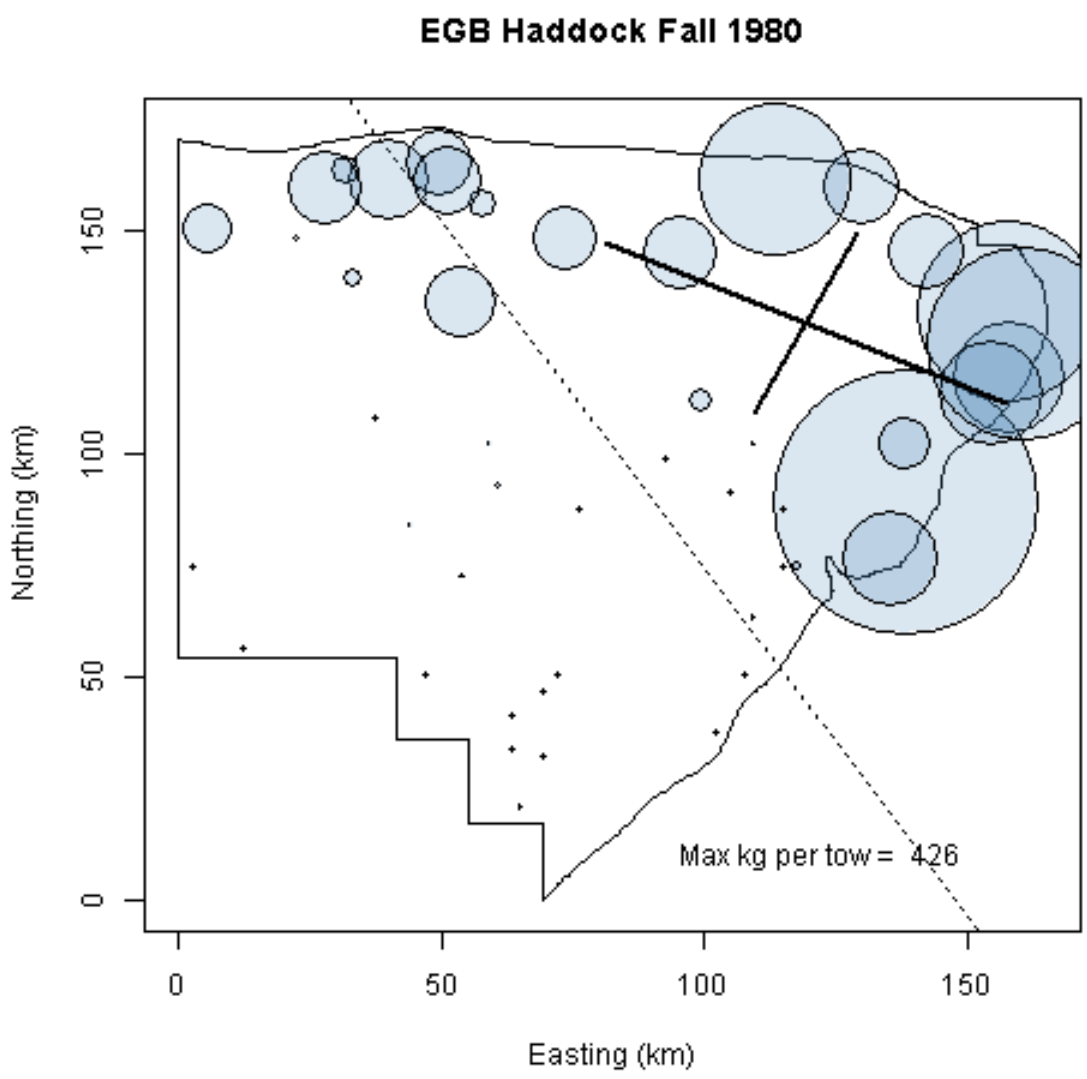

EGB Haddock Fall 1975
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 118

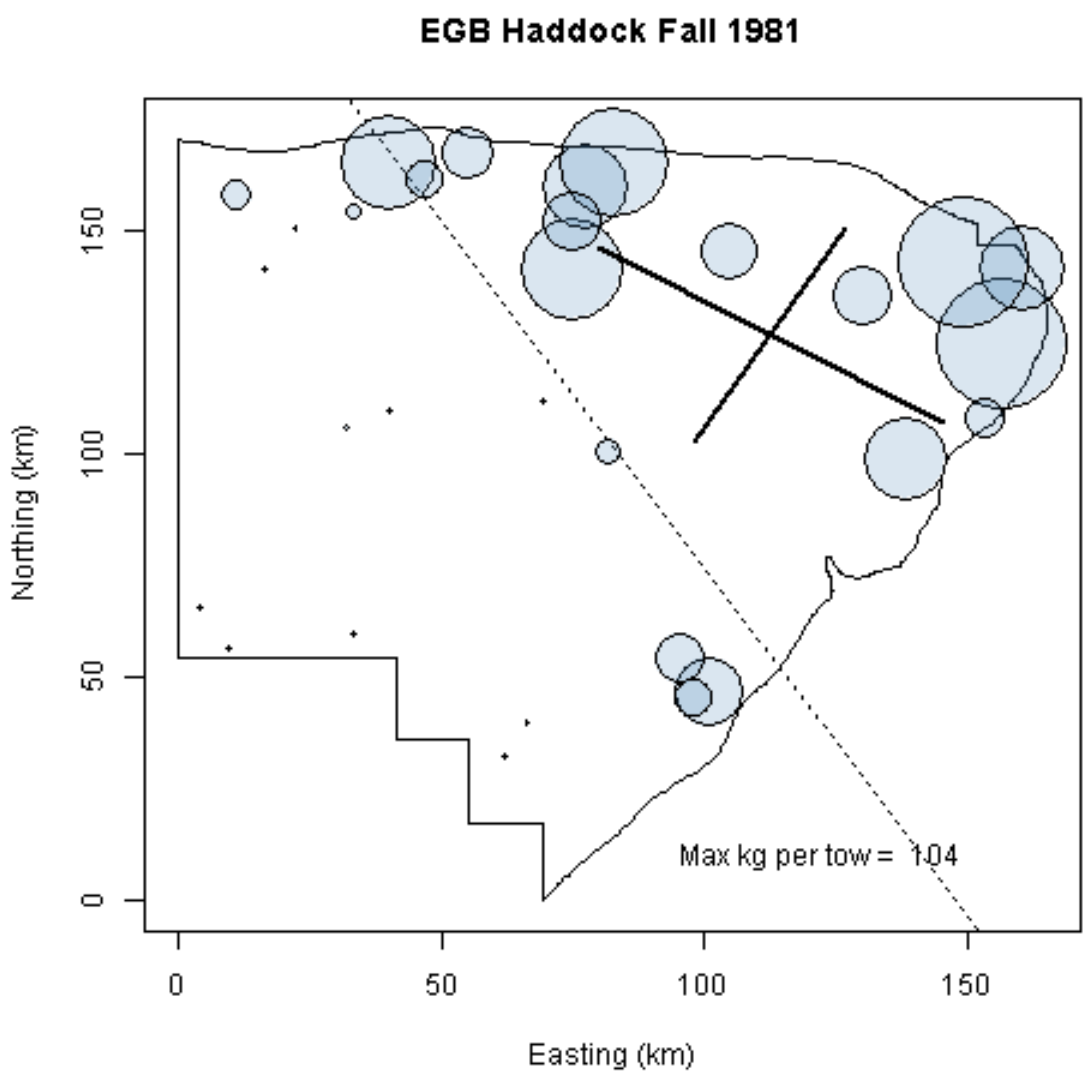

EGB Haddock Fall 1976
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 811

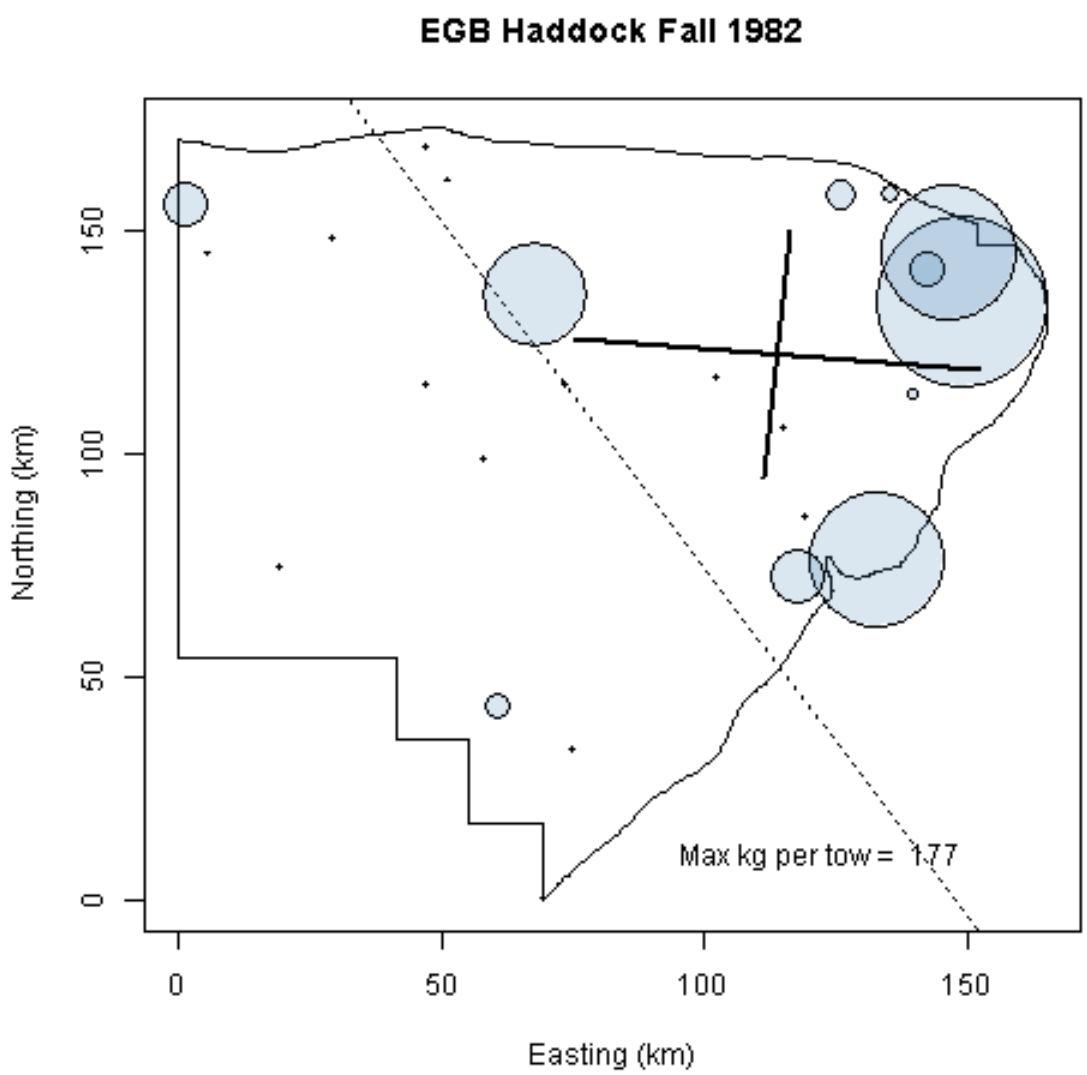

EGB Haddock Fall 1977
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 3283

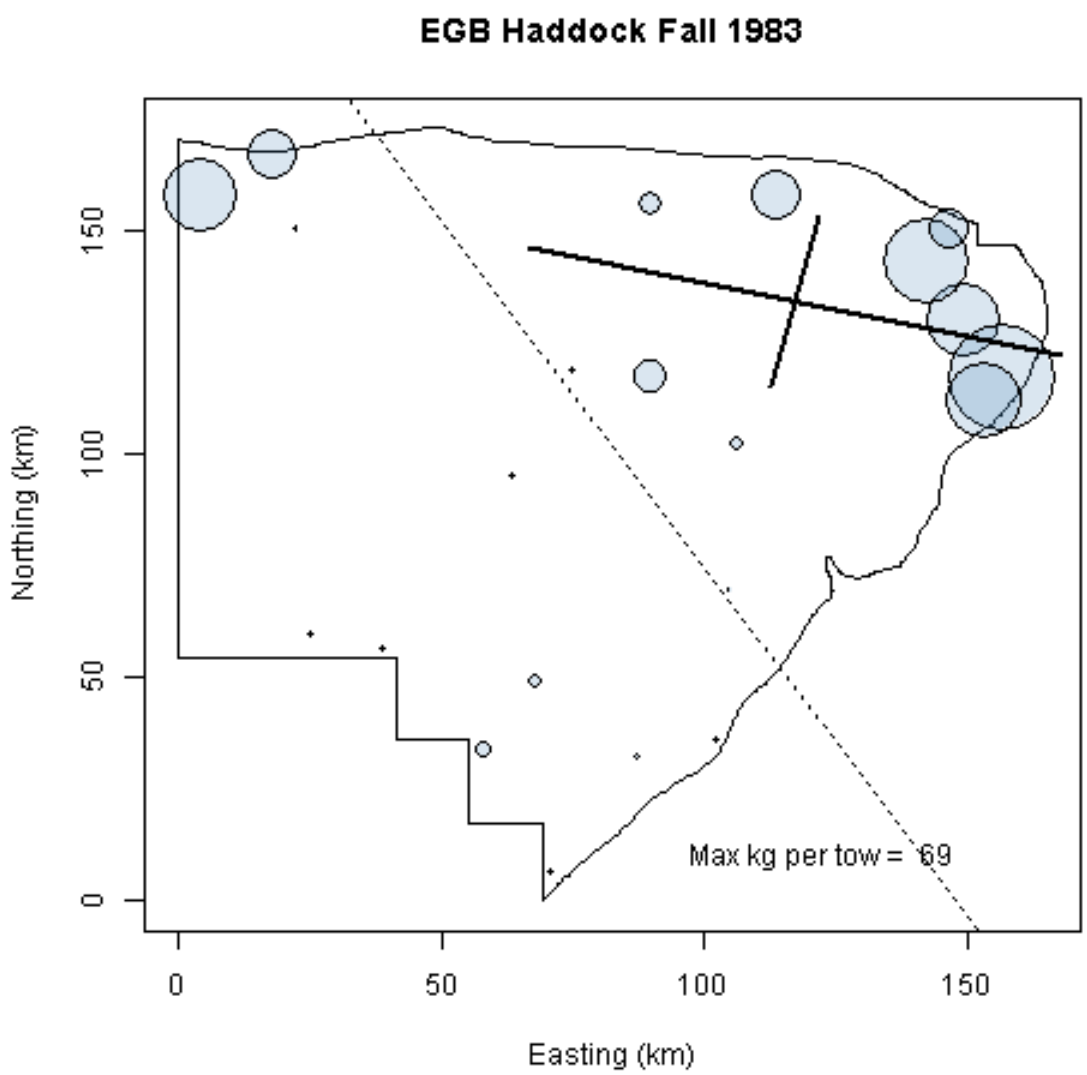

EGB Haddock Fall 1978
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 947

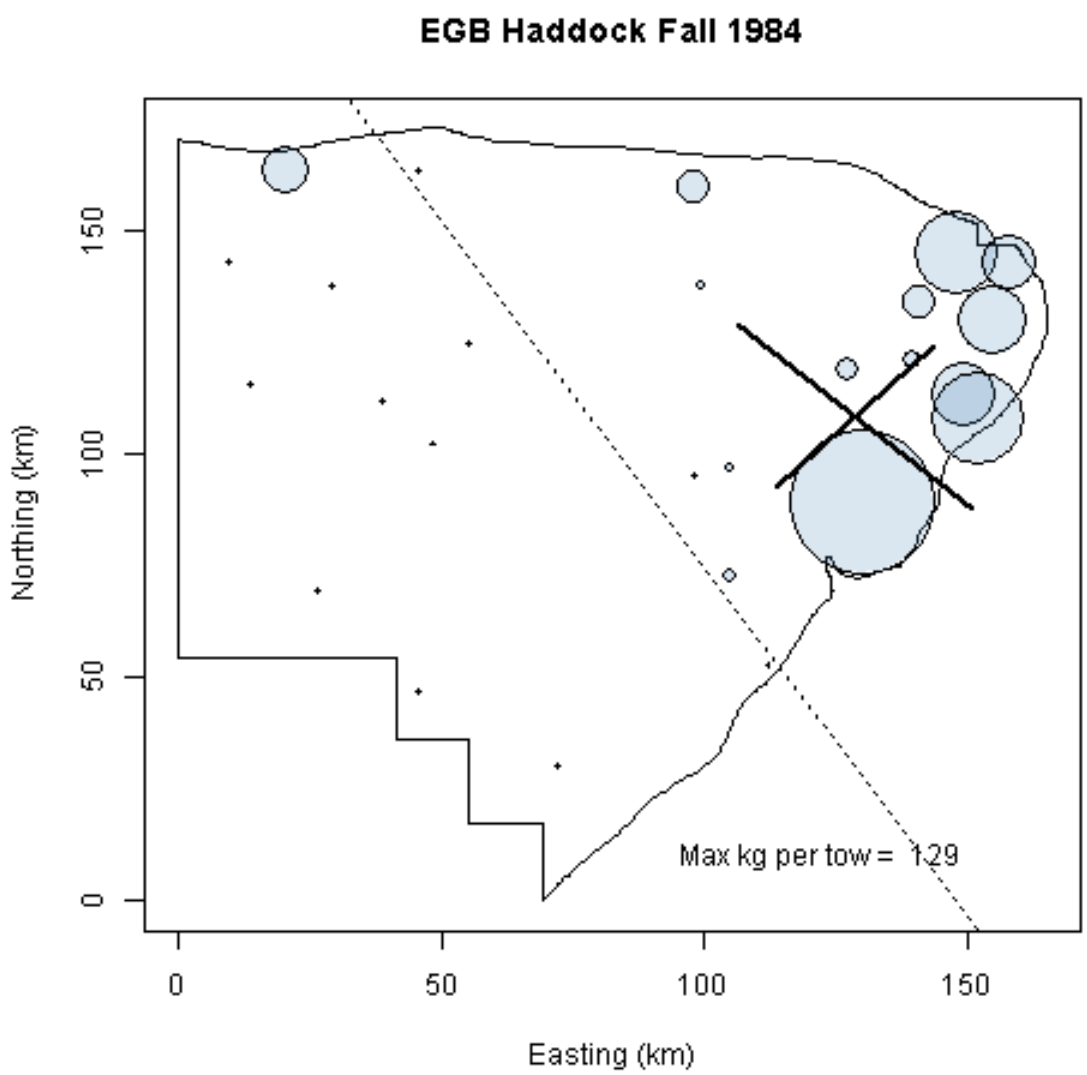

EGB Haddock Fall 1979
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 390

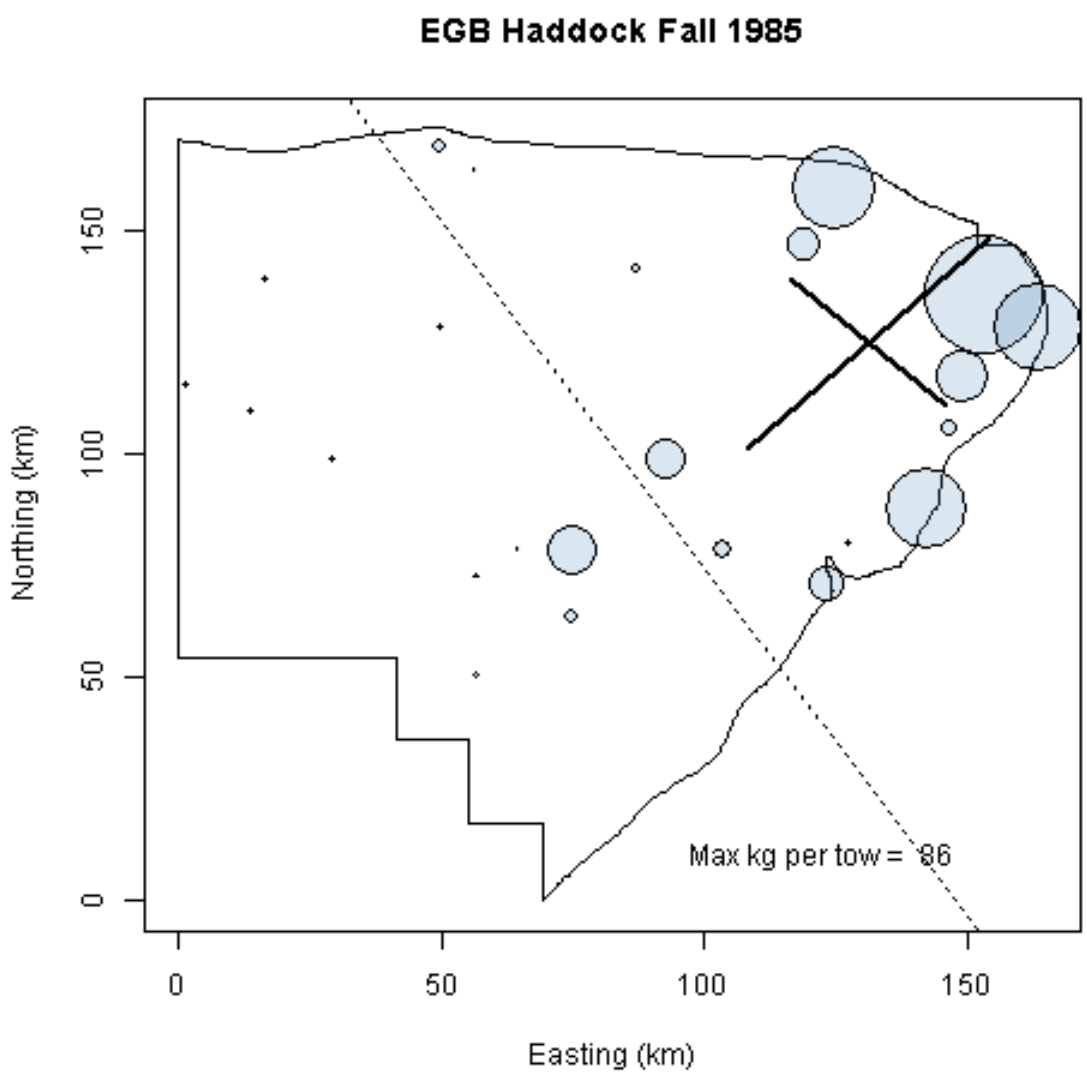

EGB Haddock Fall 1980
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 426

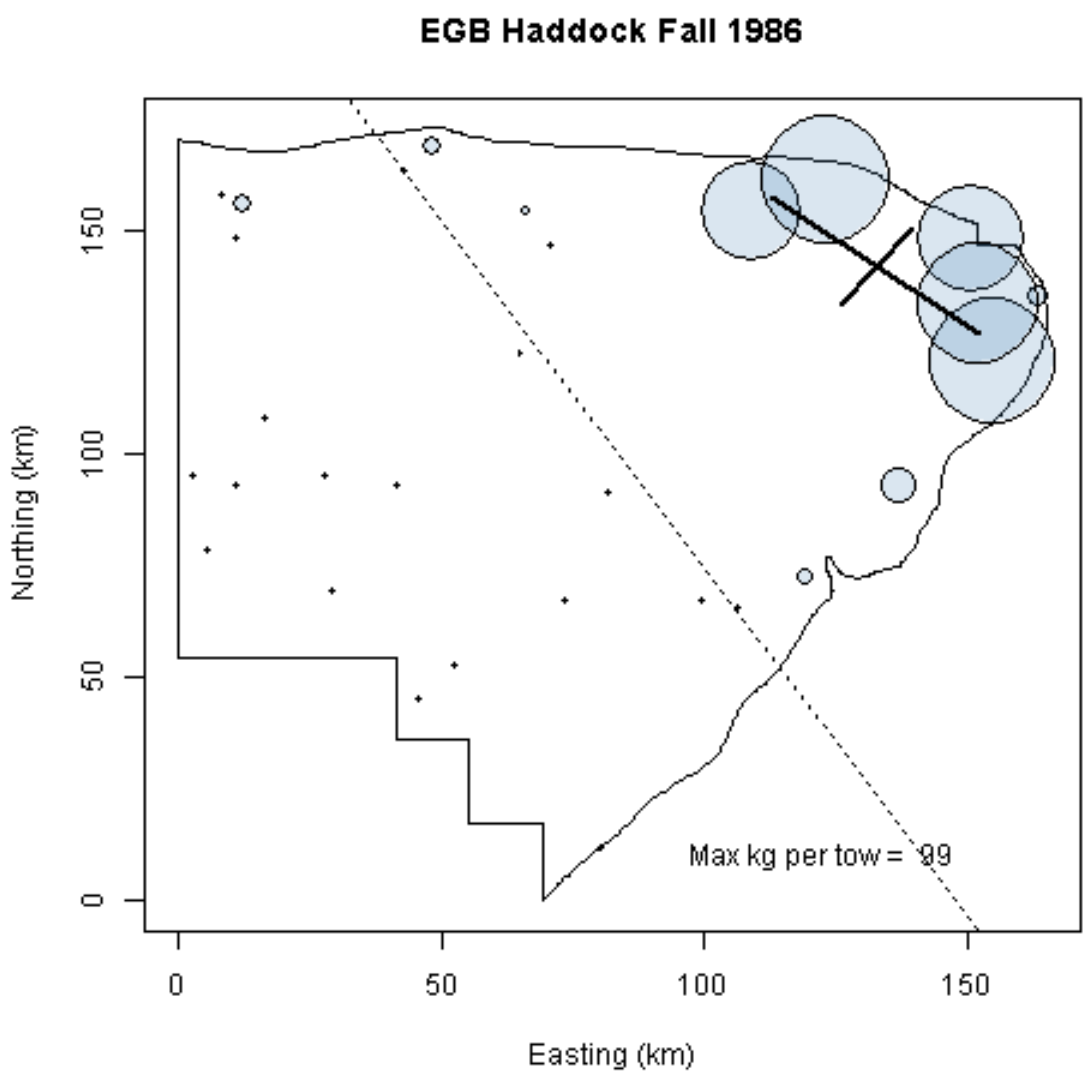

EGB Haddock Fall 1981
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 104

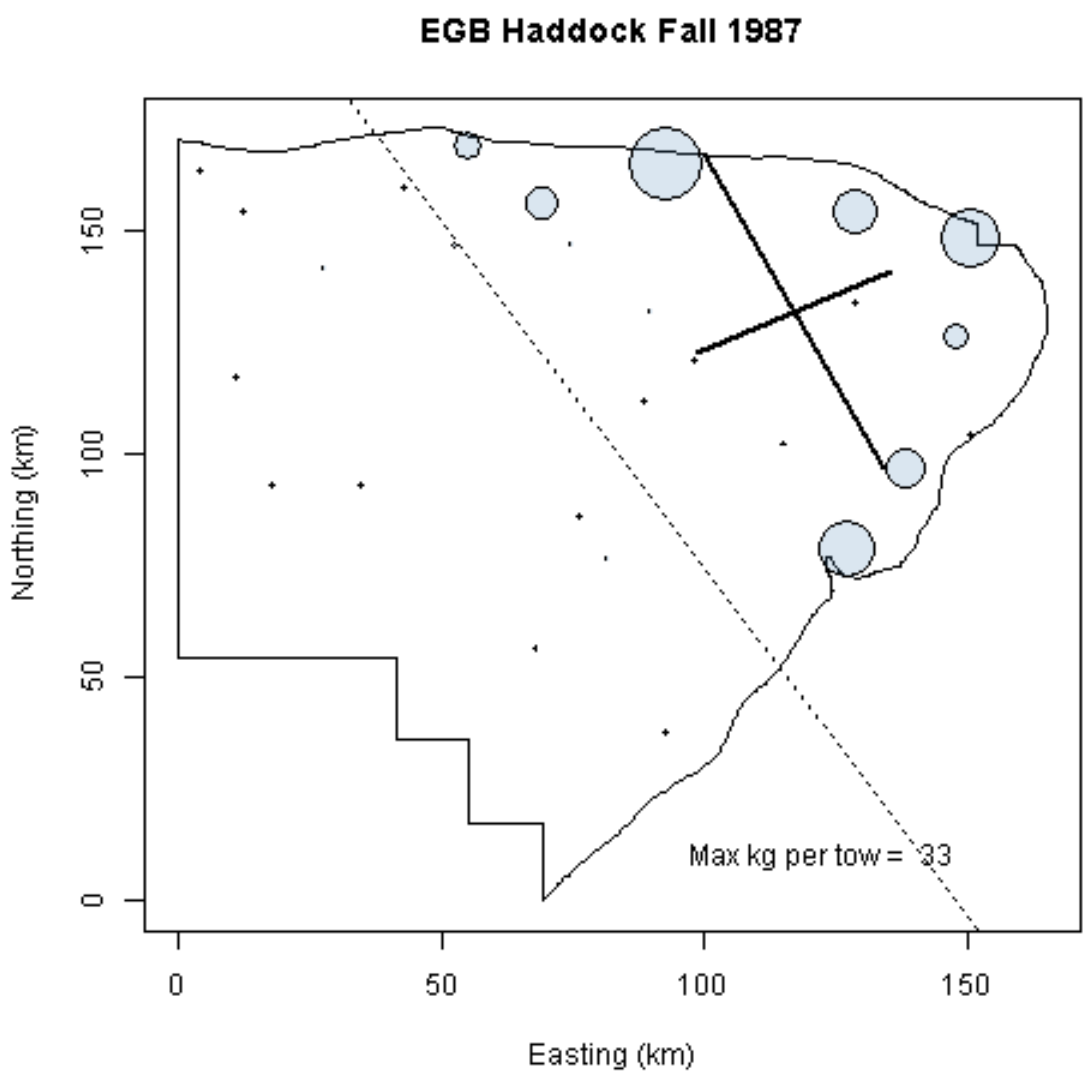

EGB Haddock Fall 1982
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 177

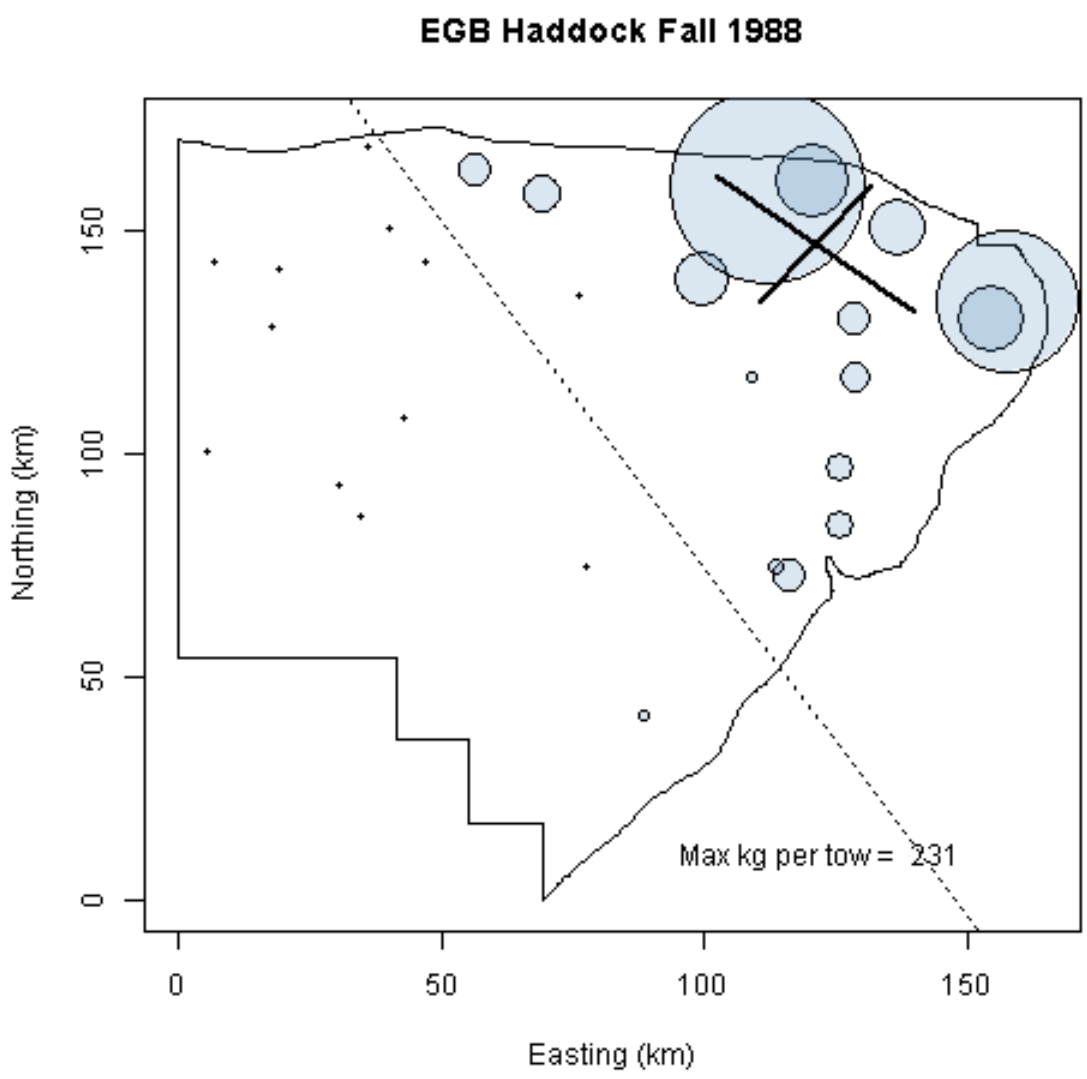

EGB Haddock Fall 1983
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 69

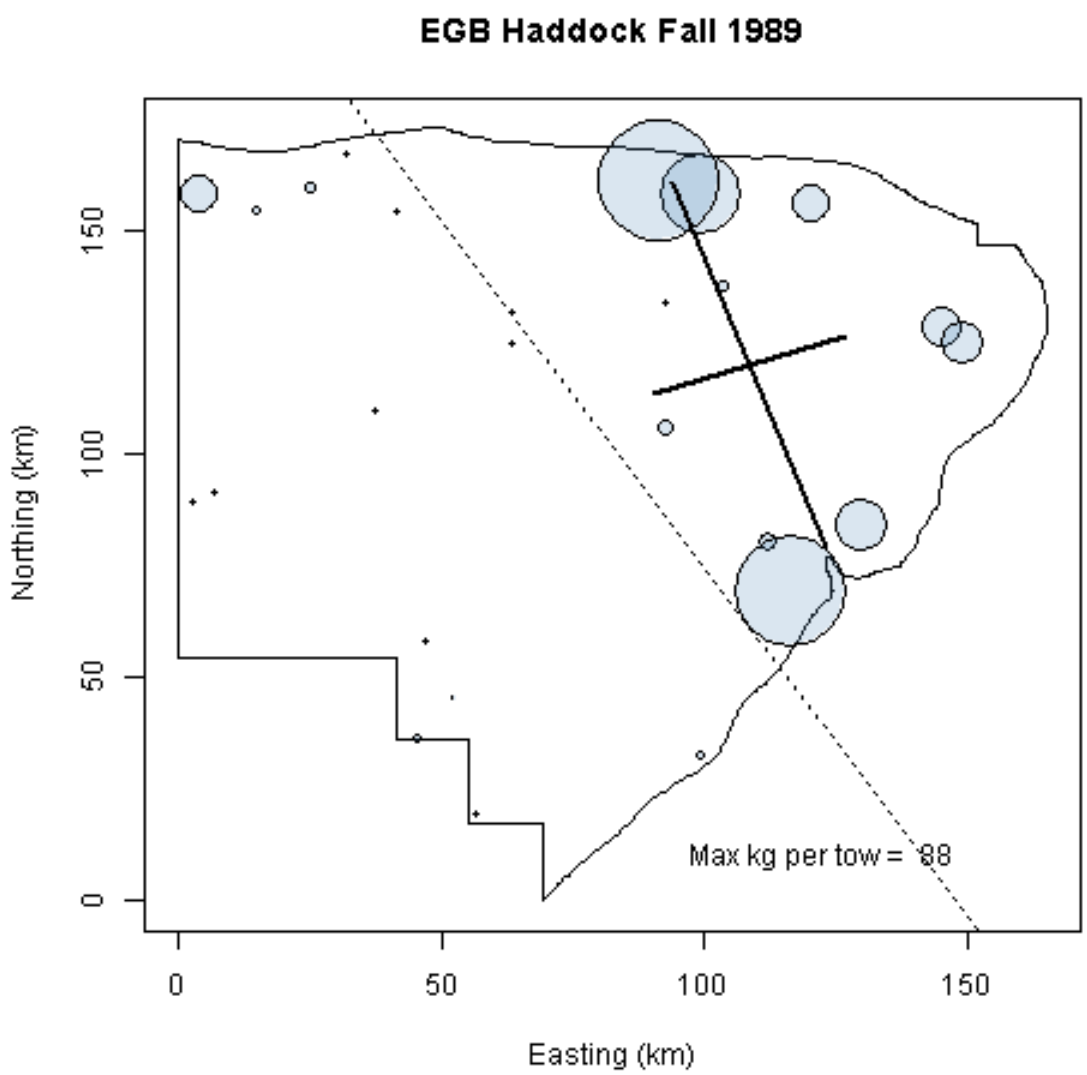

EGB Haddock Fall 1984
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 129

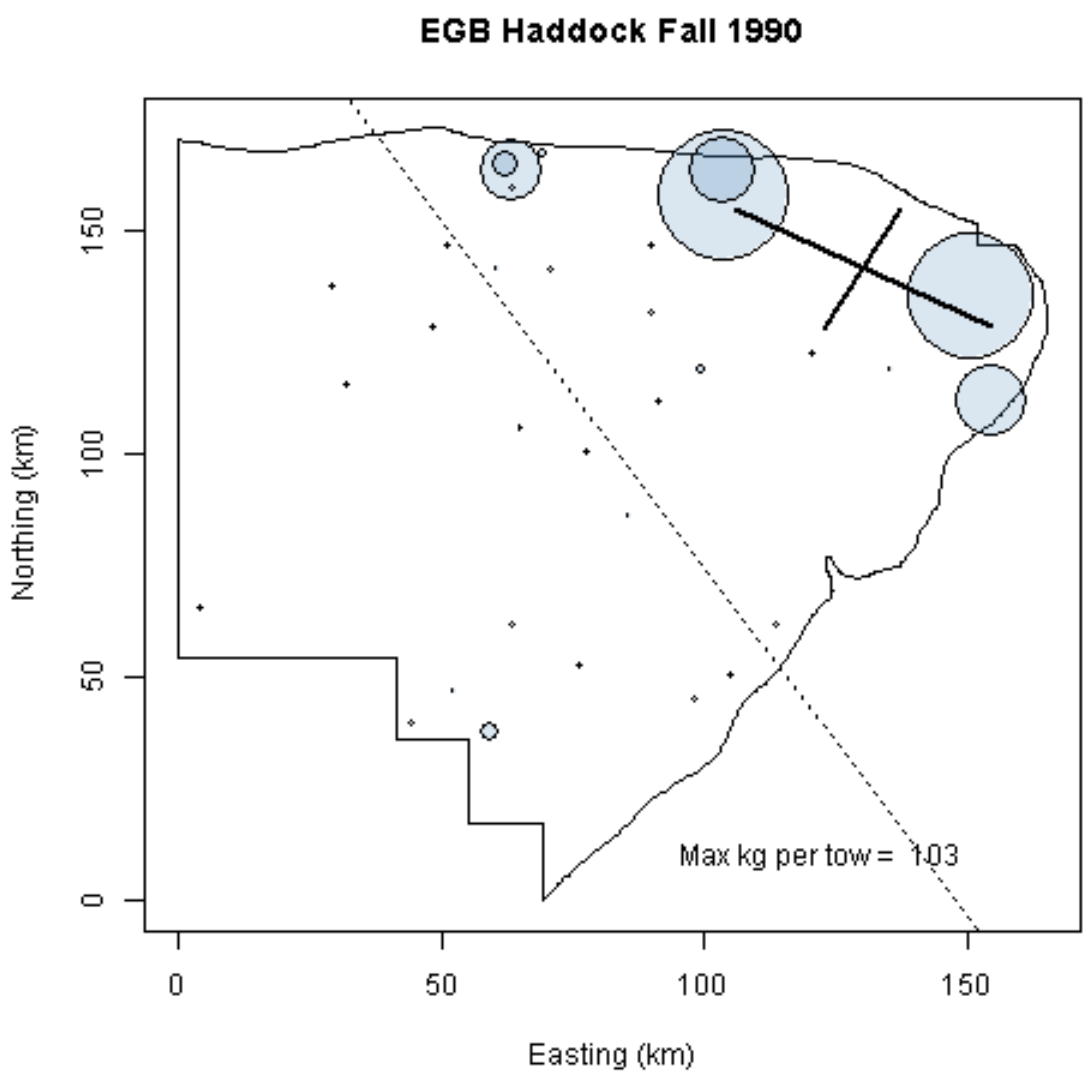

EGB Haddock Fall 1985
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 86

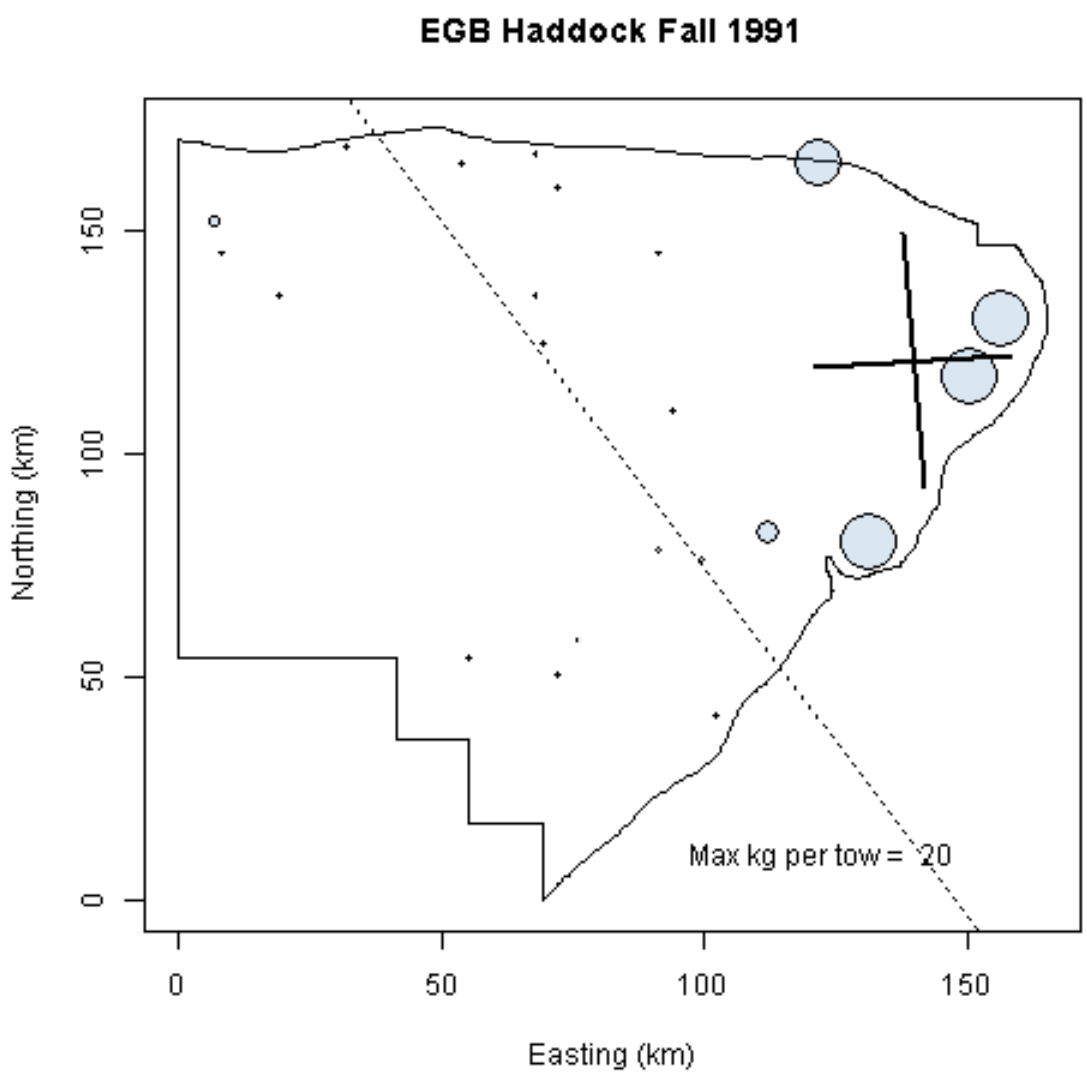

EGB Haddock Fall 1986
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 99

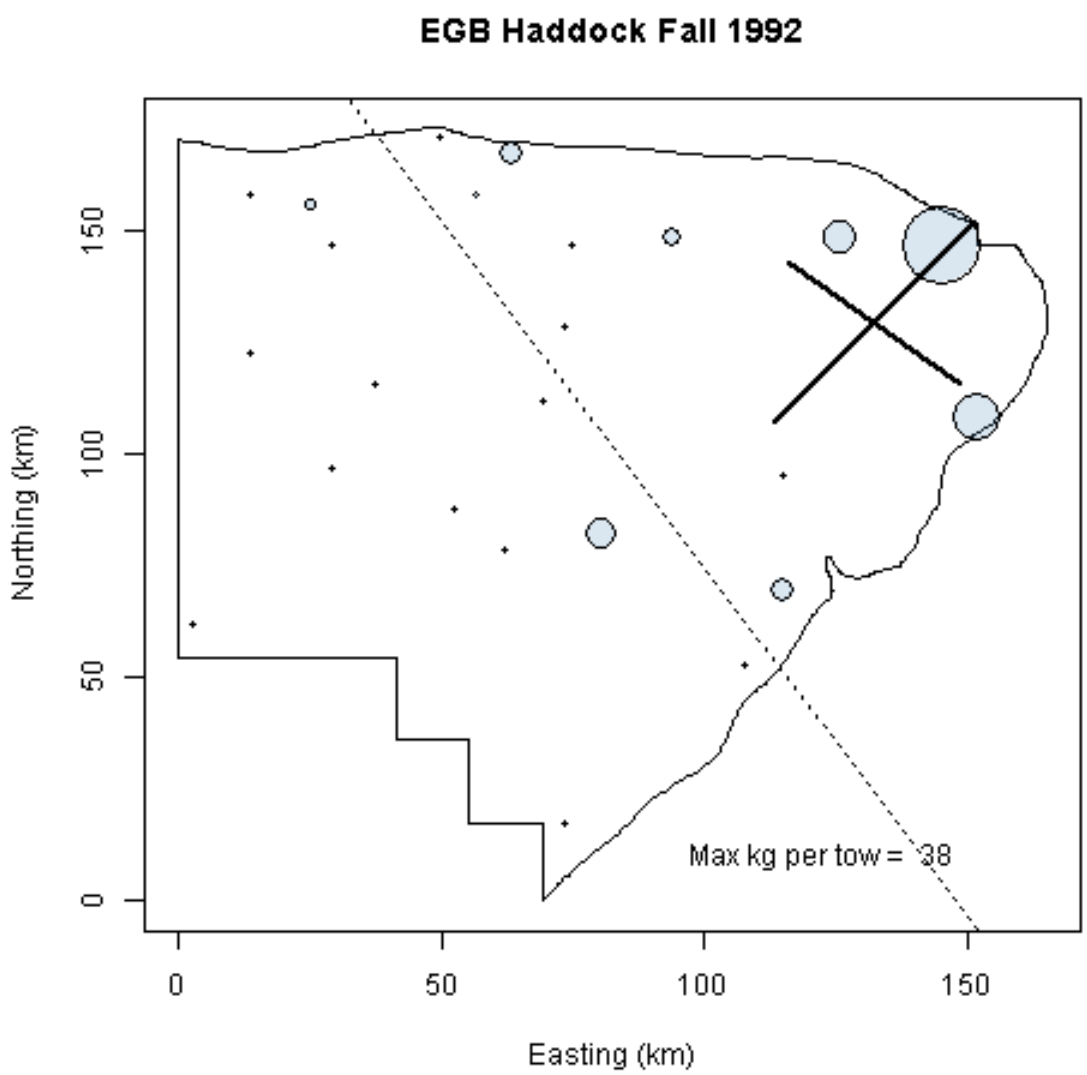

EGB Haddock Fall 1987
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 33

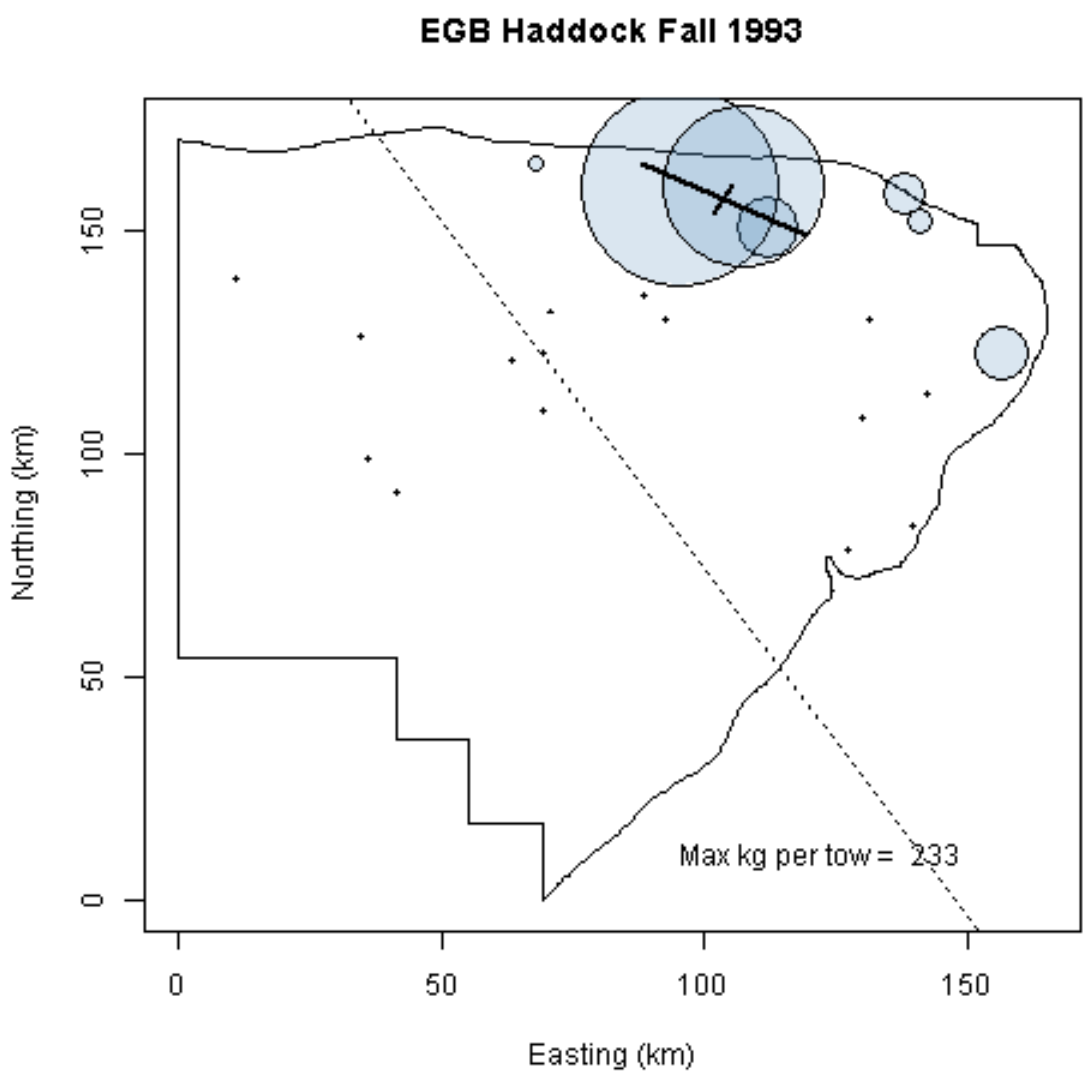

EGB Haddock Fall 1988
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 231

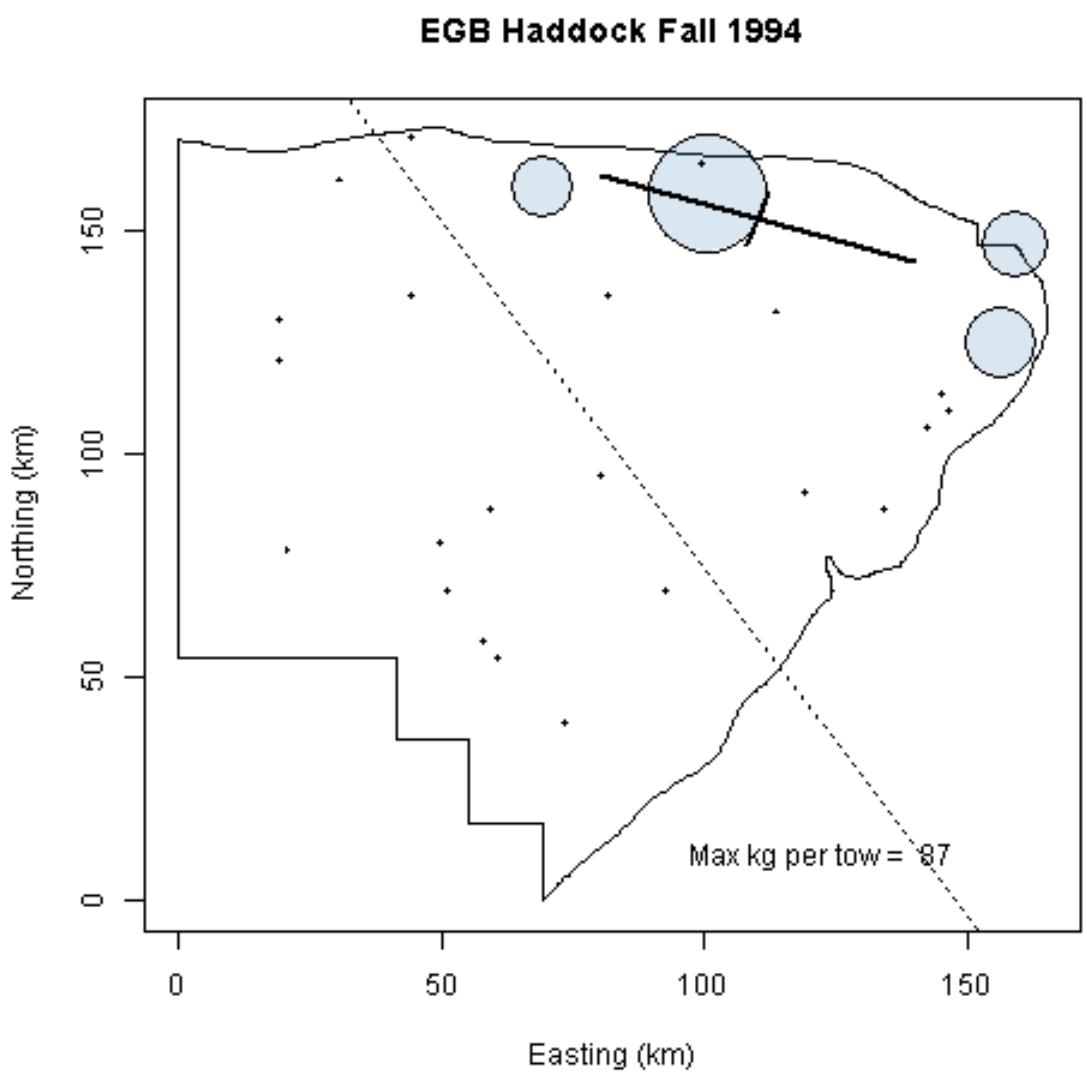

EGB Haddock Fall 1989
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 88

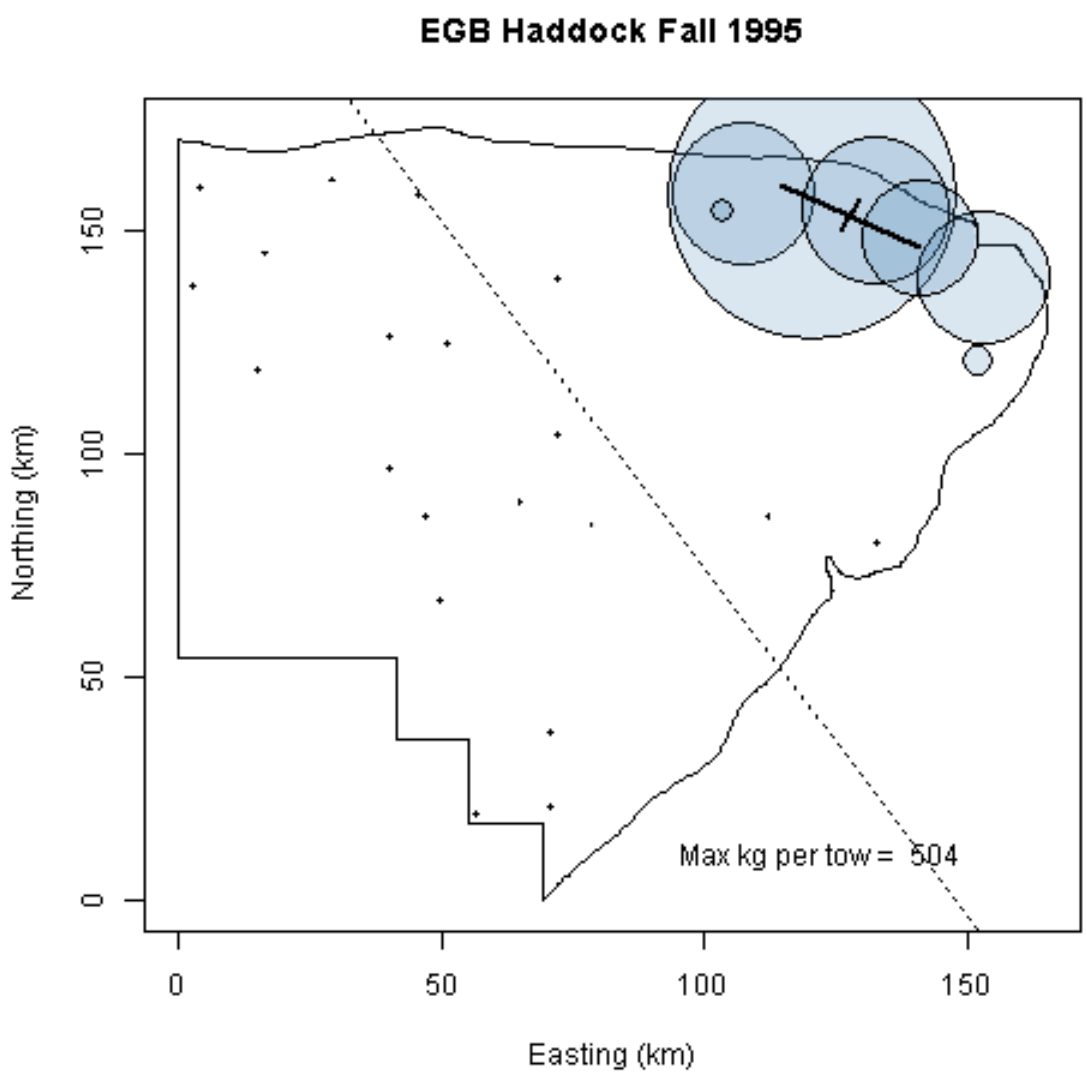

EGB Haddock Fall 1990
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 103

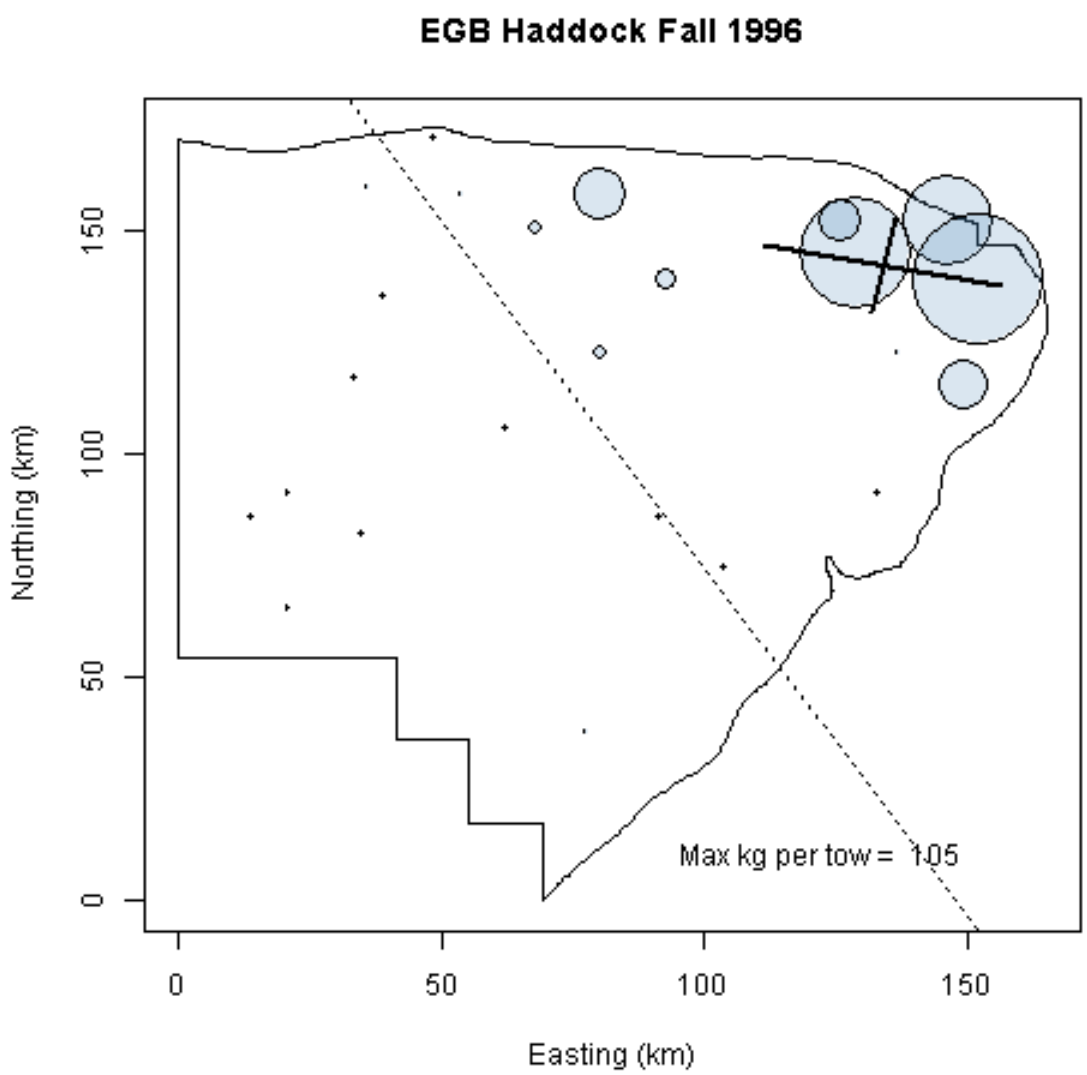

EGB Haddock Fall 1991
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 20

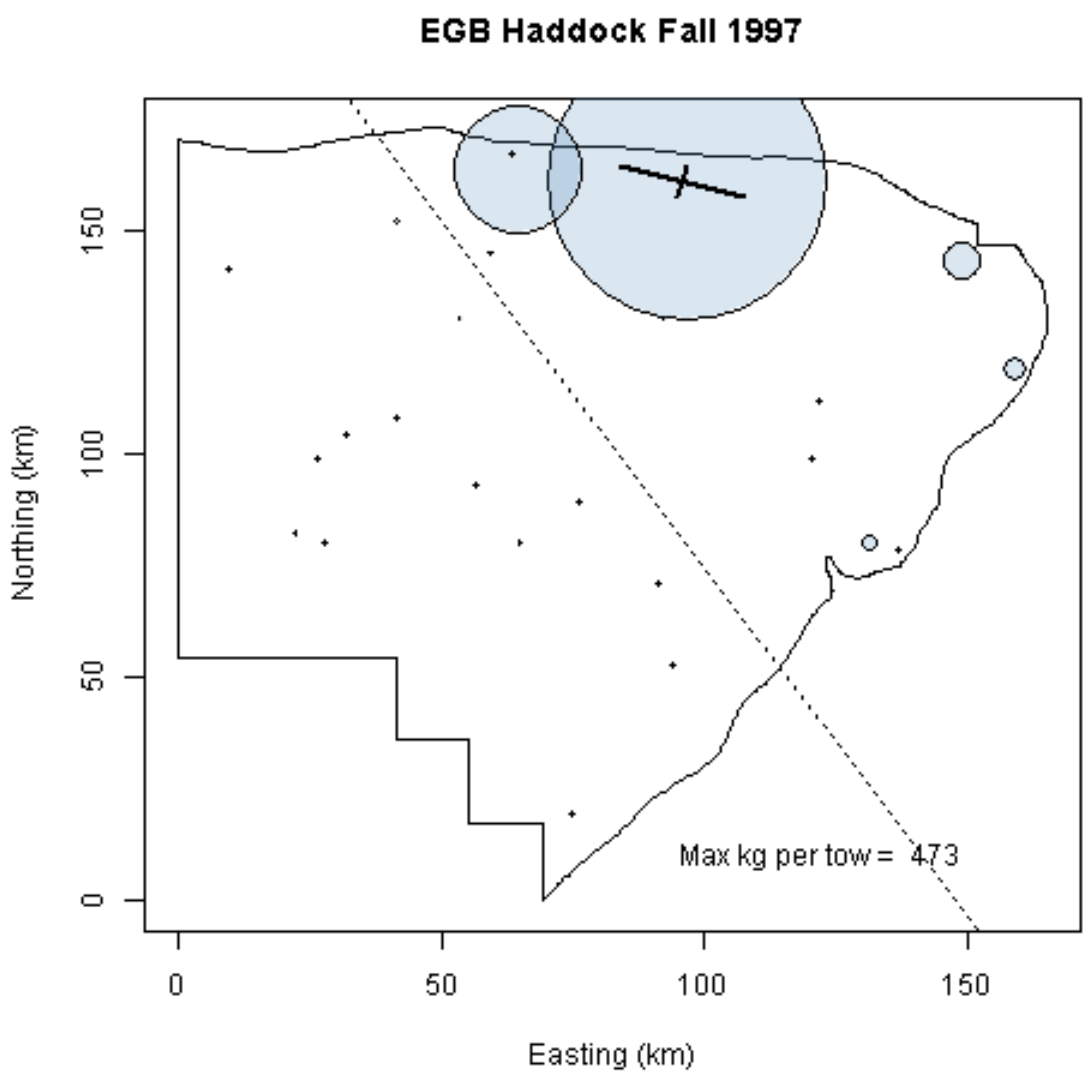

EGB Haddock Fall 1992
Northing (km)
Easting (km)
0
50
100
150
Max kg per tow = 38

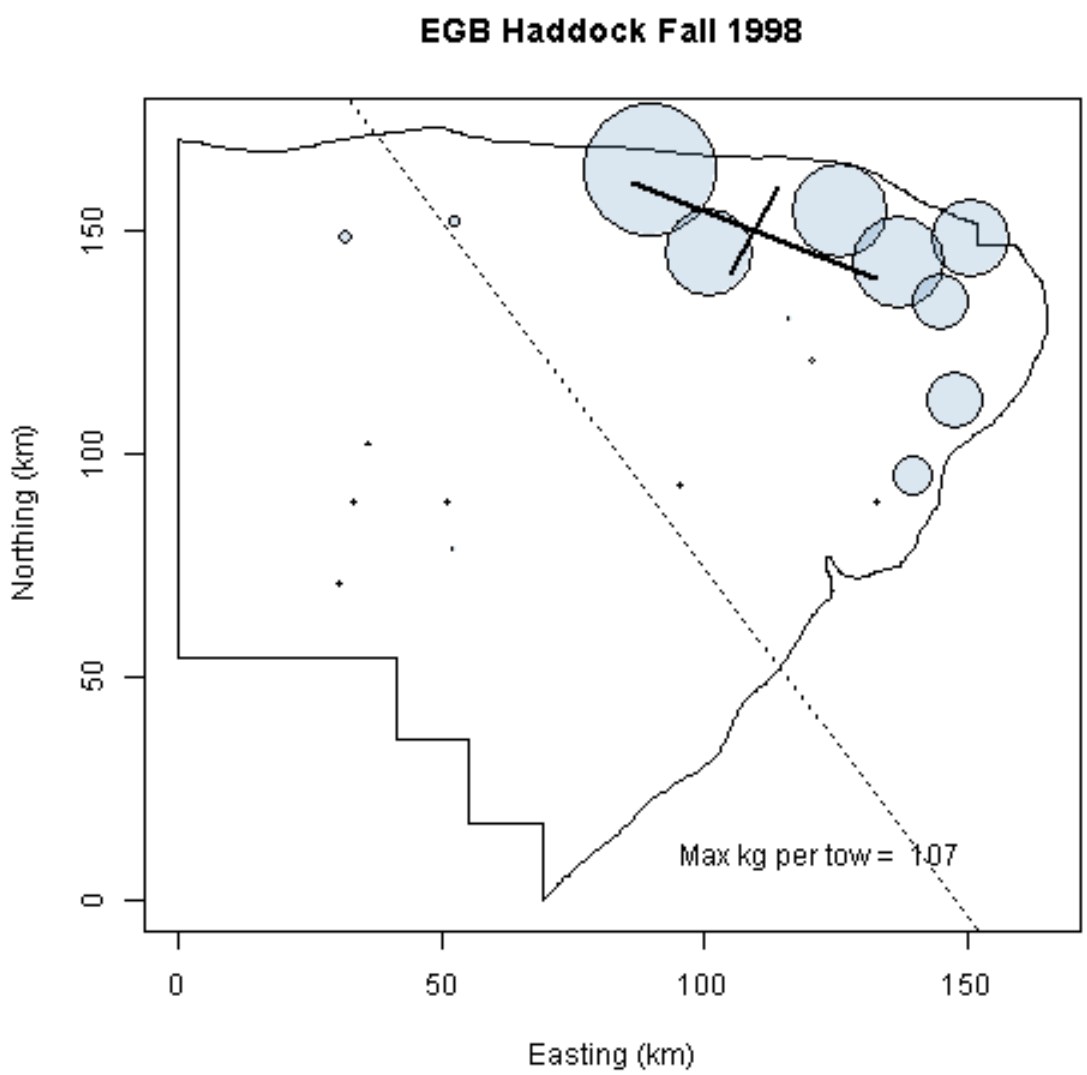

EGB Haddock Fall 1993
Northing (km)
Easting (km)
0
50
100
150
Max kg per tow = 233

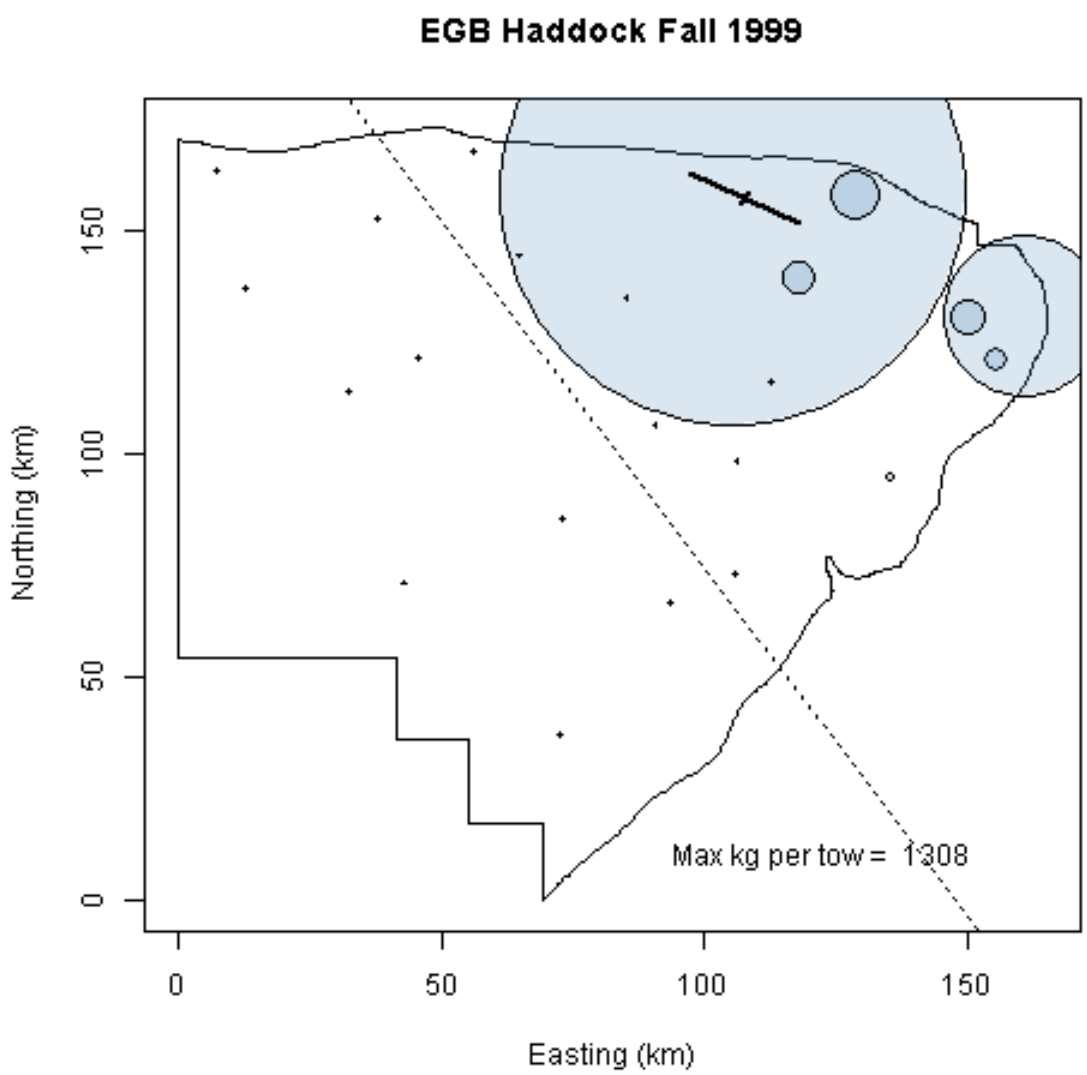

EGB Haddock Fall 1994
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 87

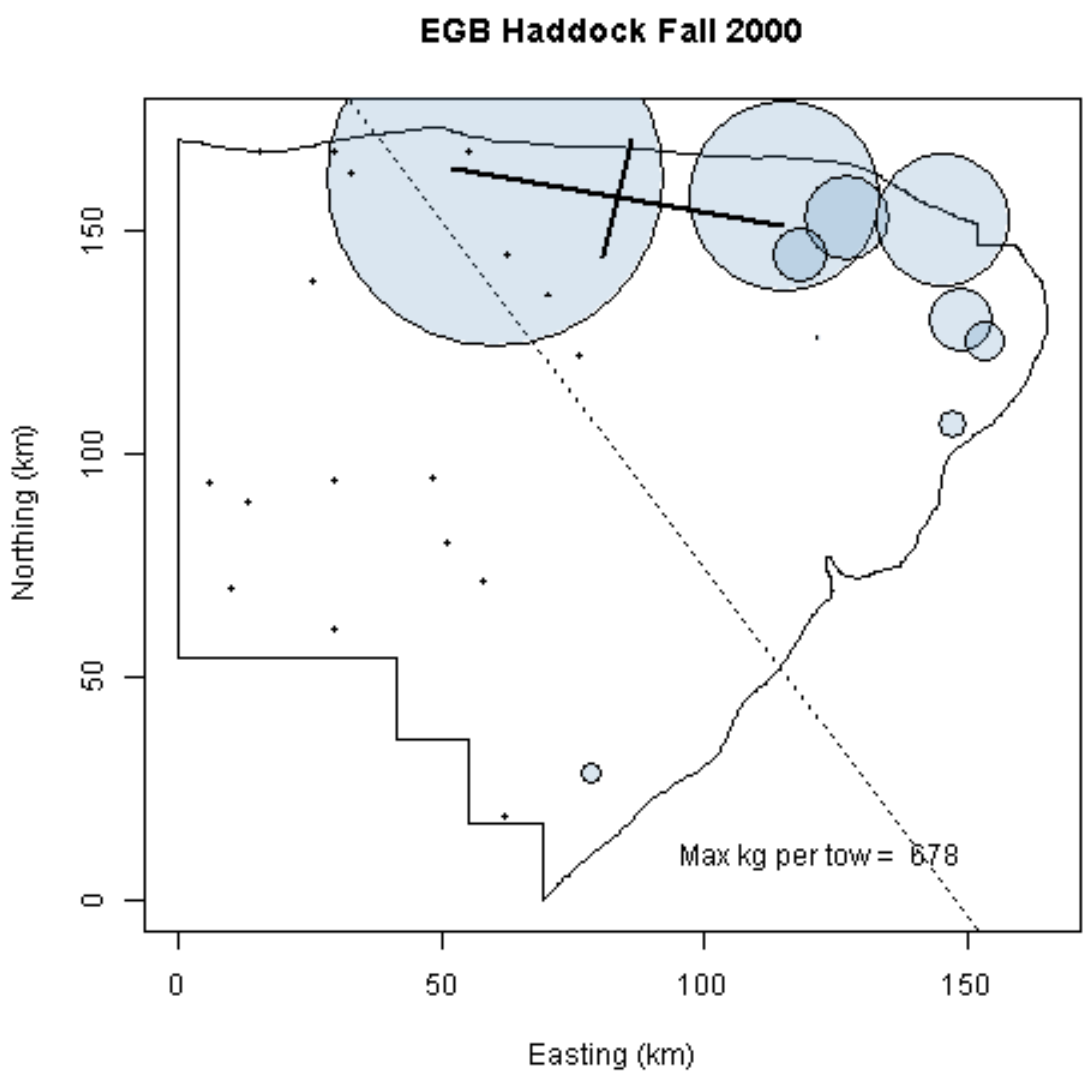

EGB Haddock Fall 1995
Northing (km)
Easting (km)
0
50
100
150
Max kg per tow = 504

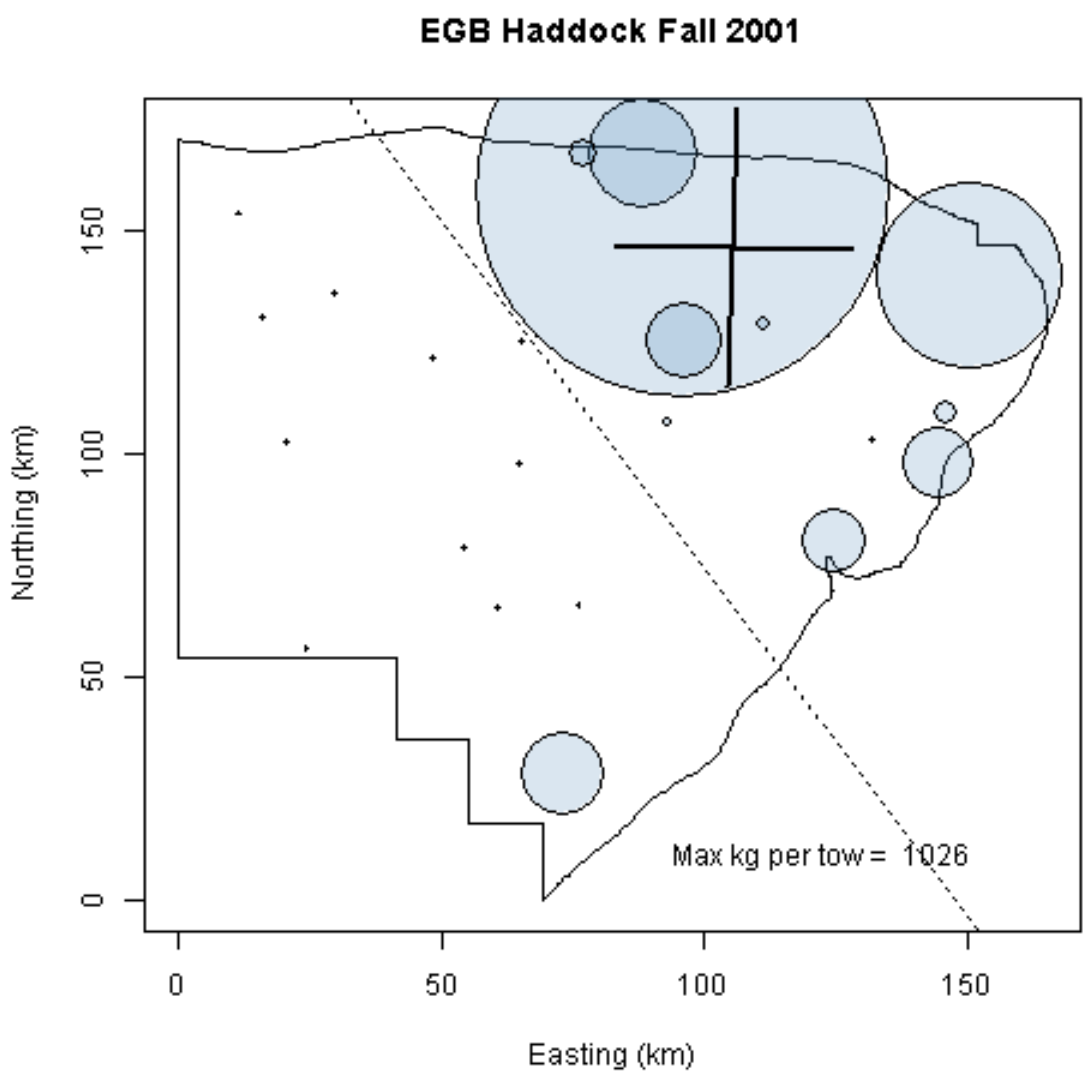

EGB Haddock Fall 1996
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 105

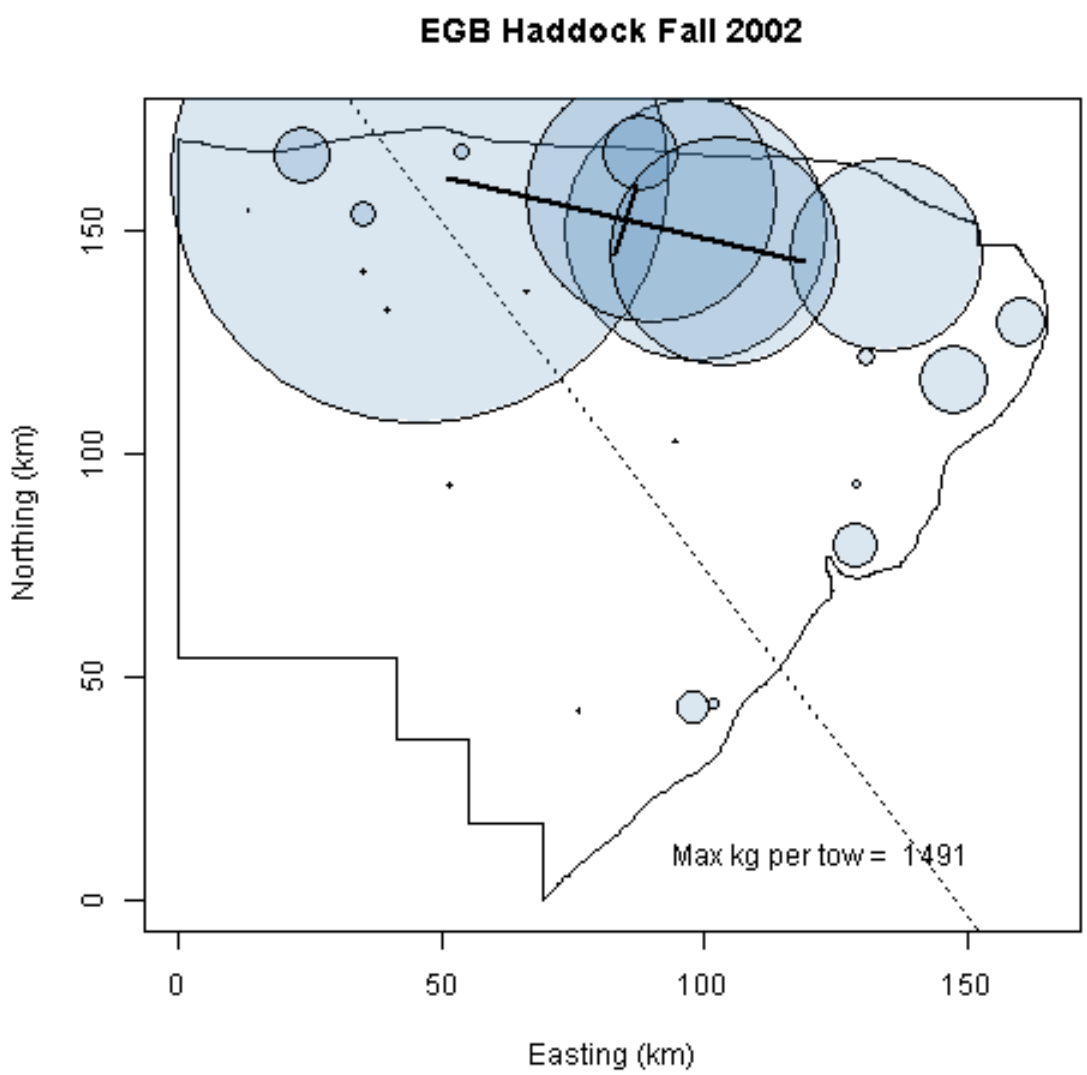

EGB Haddock Fall 1997
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 473

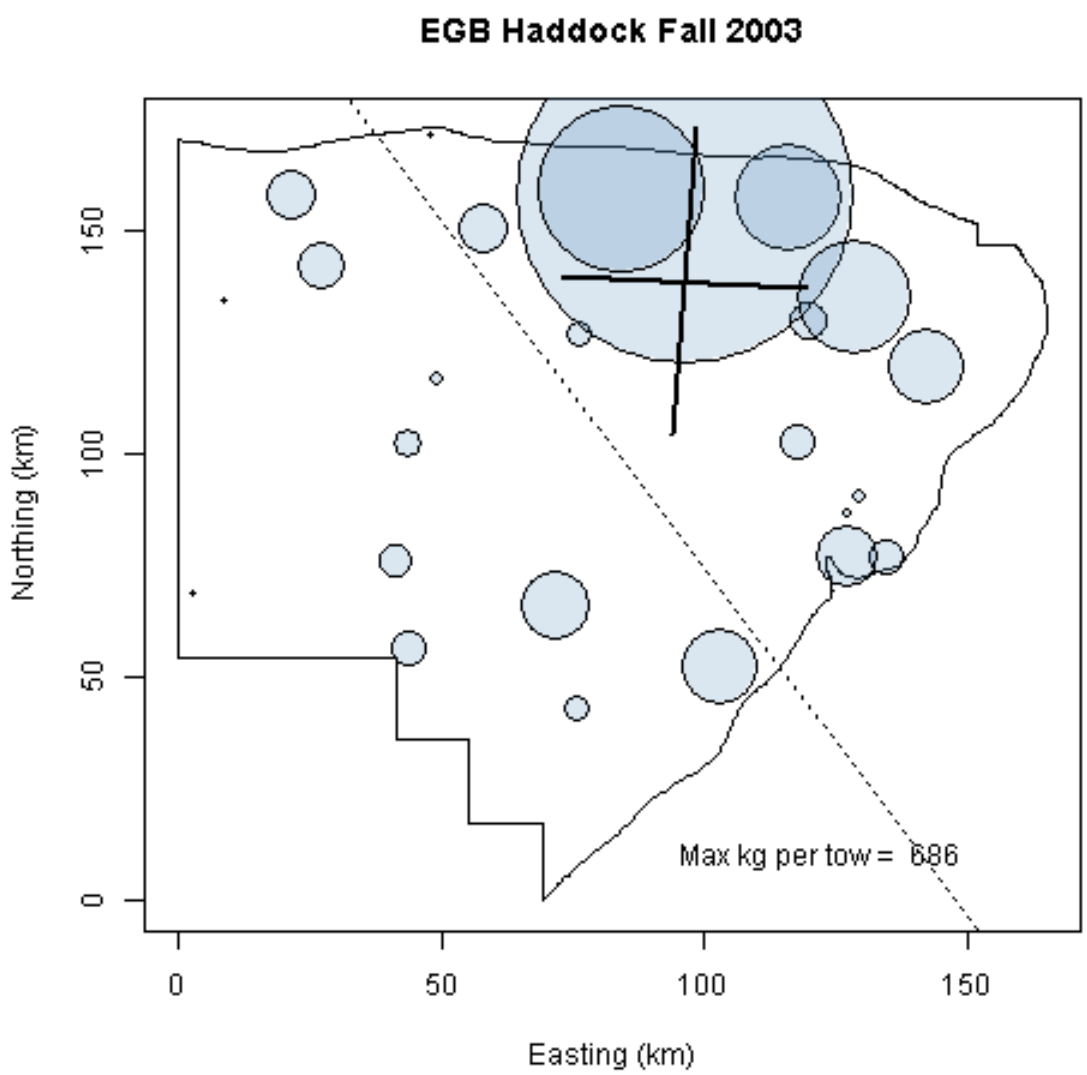

EGB Haddock Fall 1998
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 107

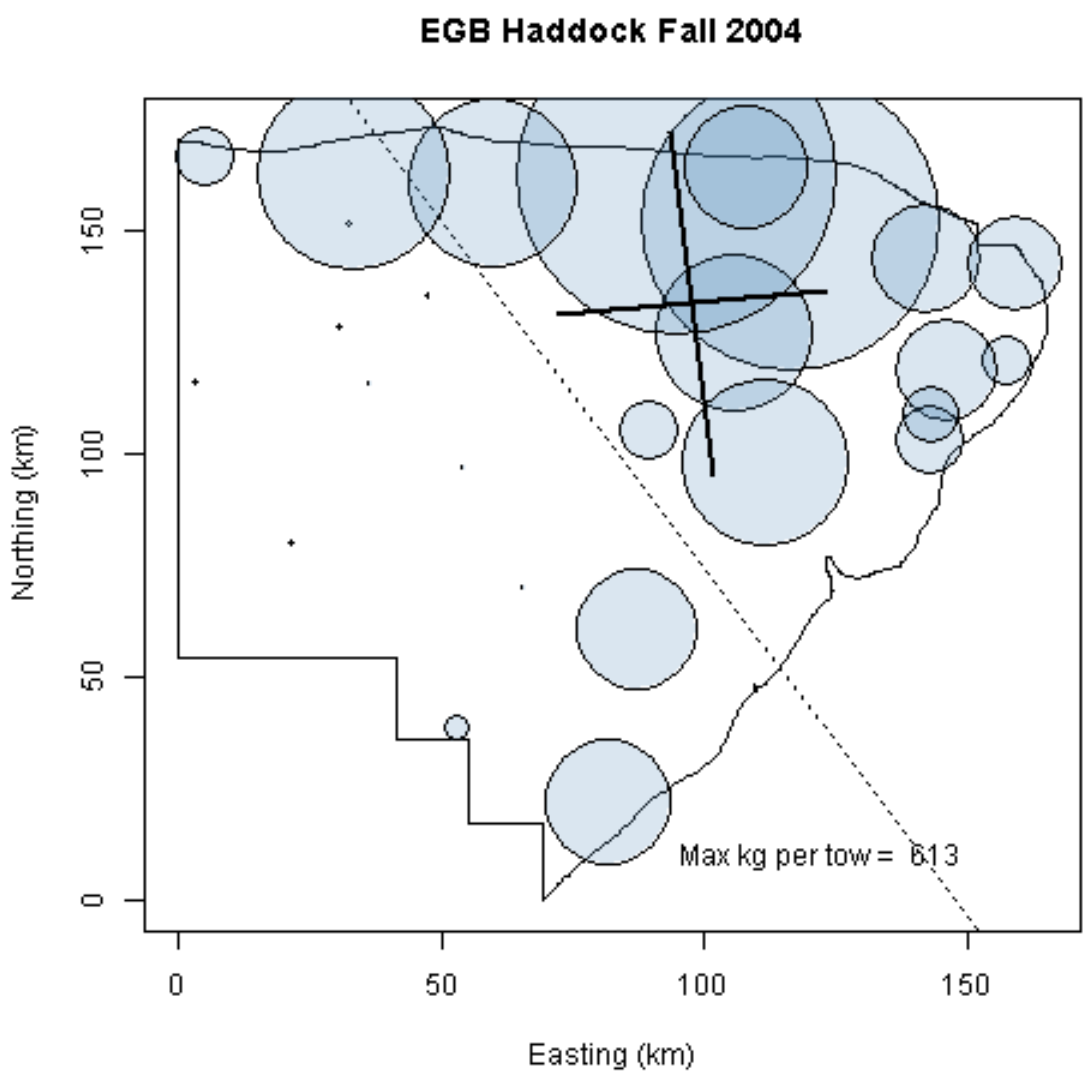

EGB Haddock Fall 1999
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 1308

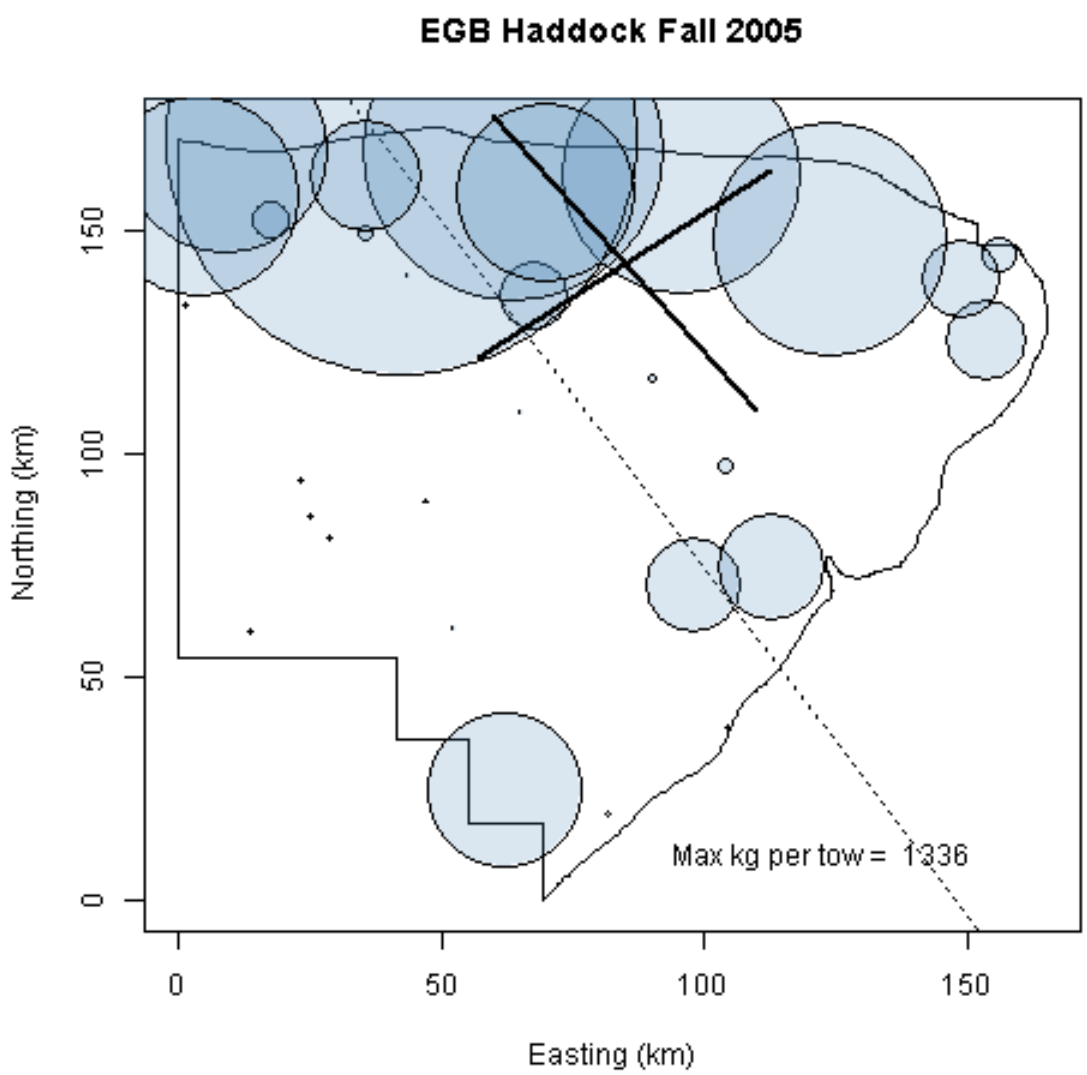

EGB Haddock Fall 2000
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 678

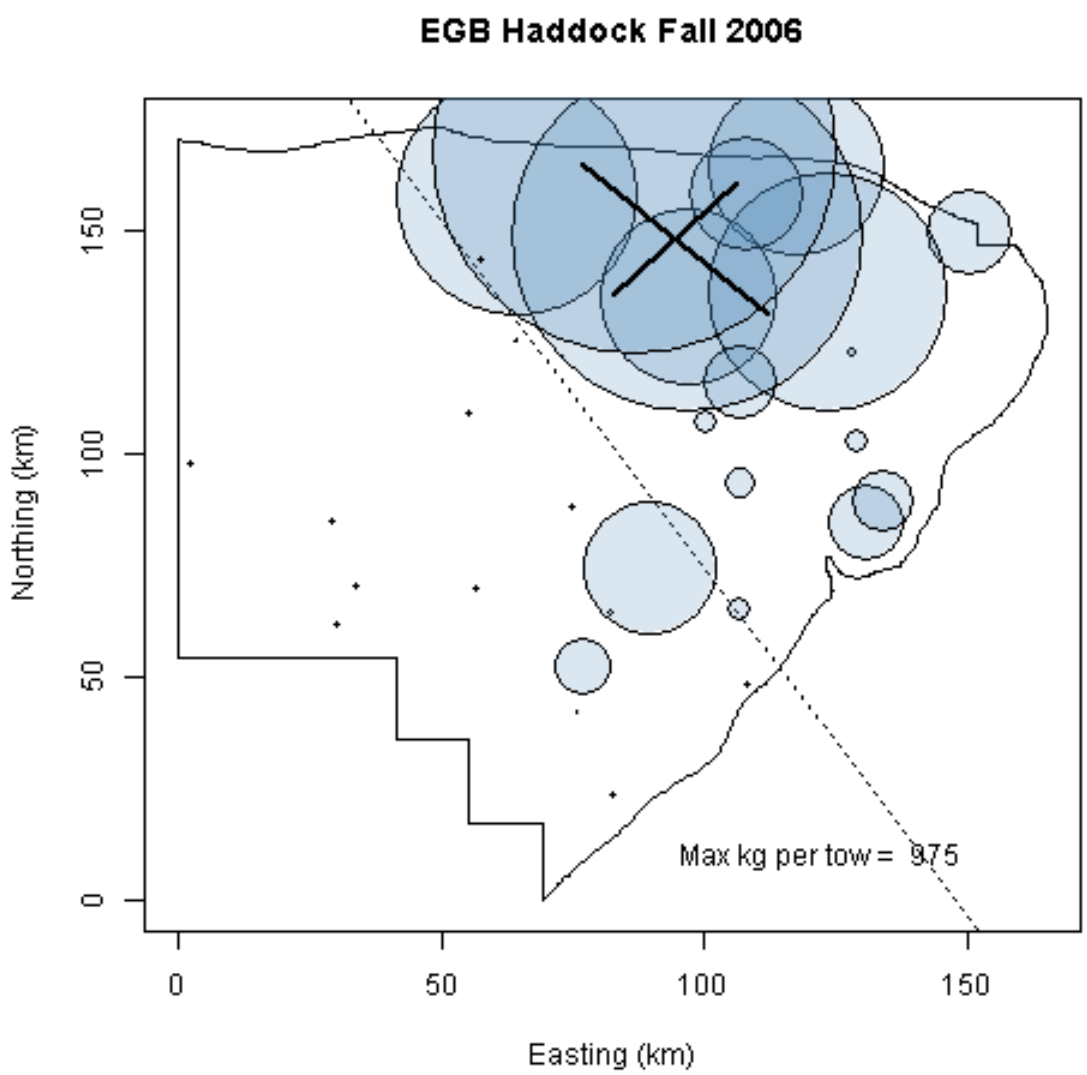

EGB Haddock Fall 2001
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 1026

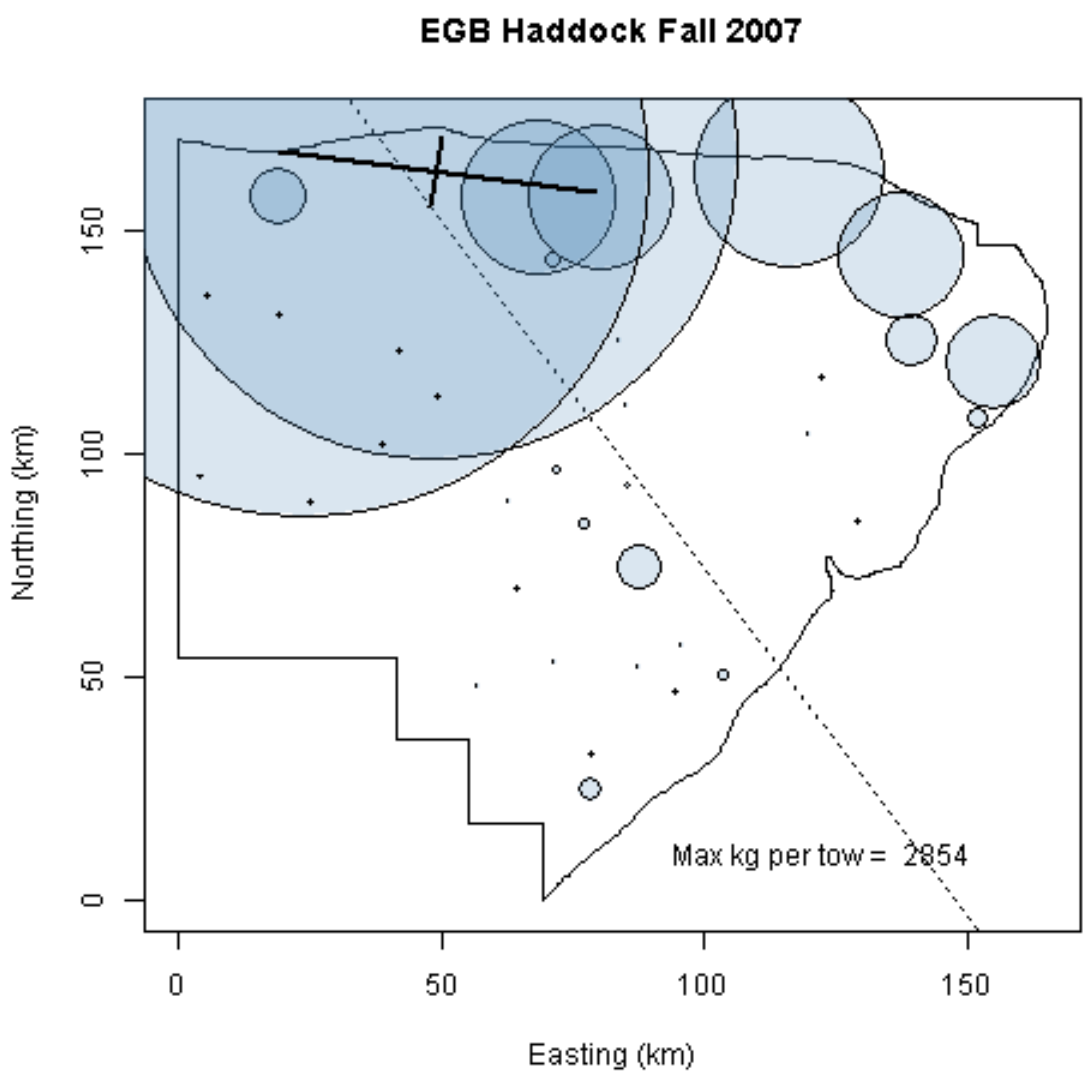

EGB Haddock Fall 2002
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 1491

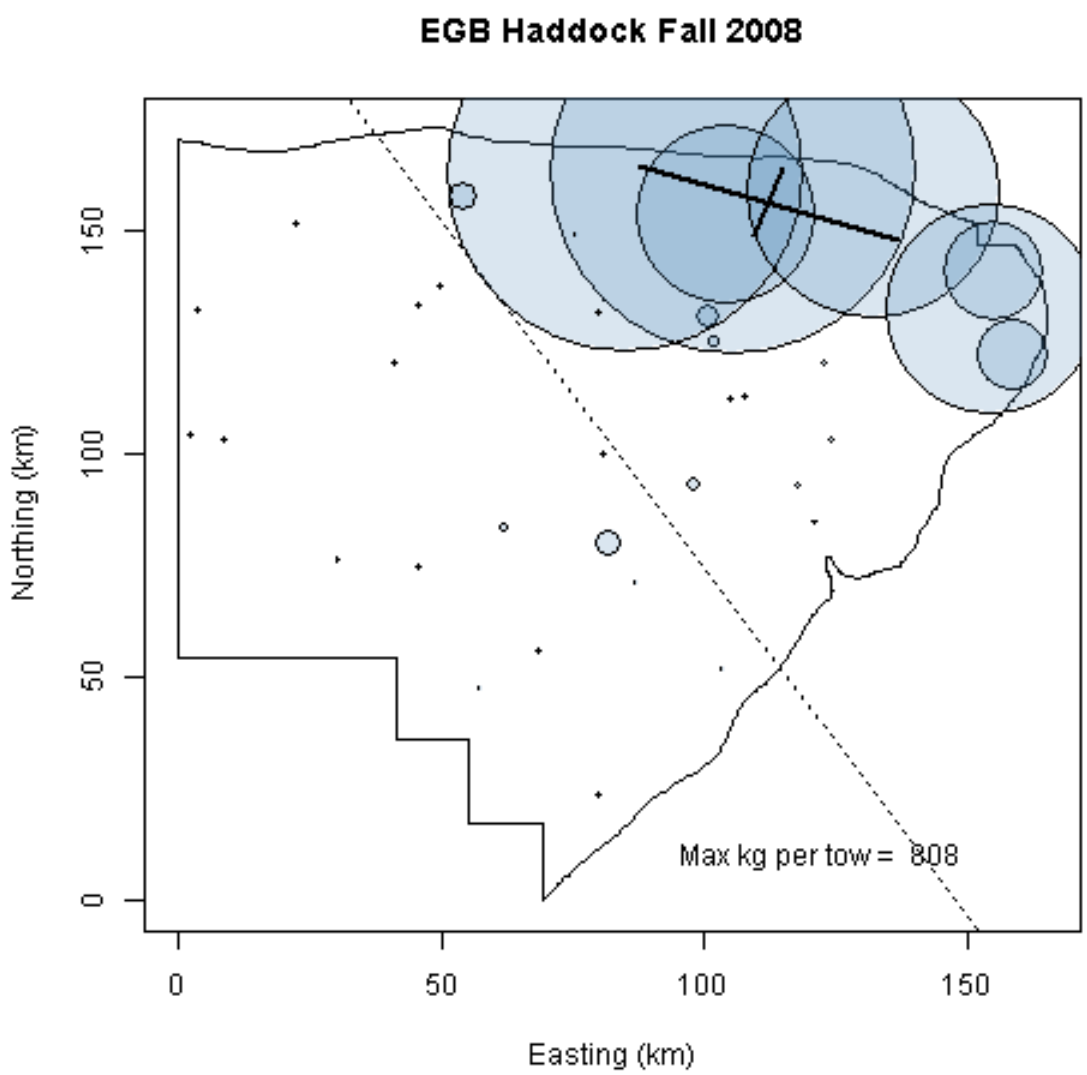

EGB Haddock Fall 2003
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 686

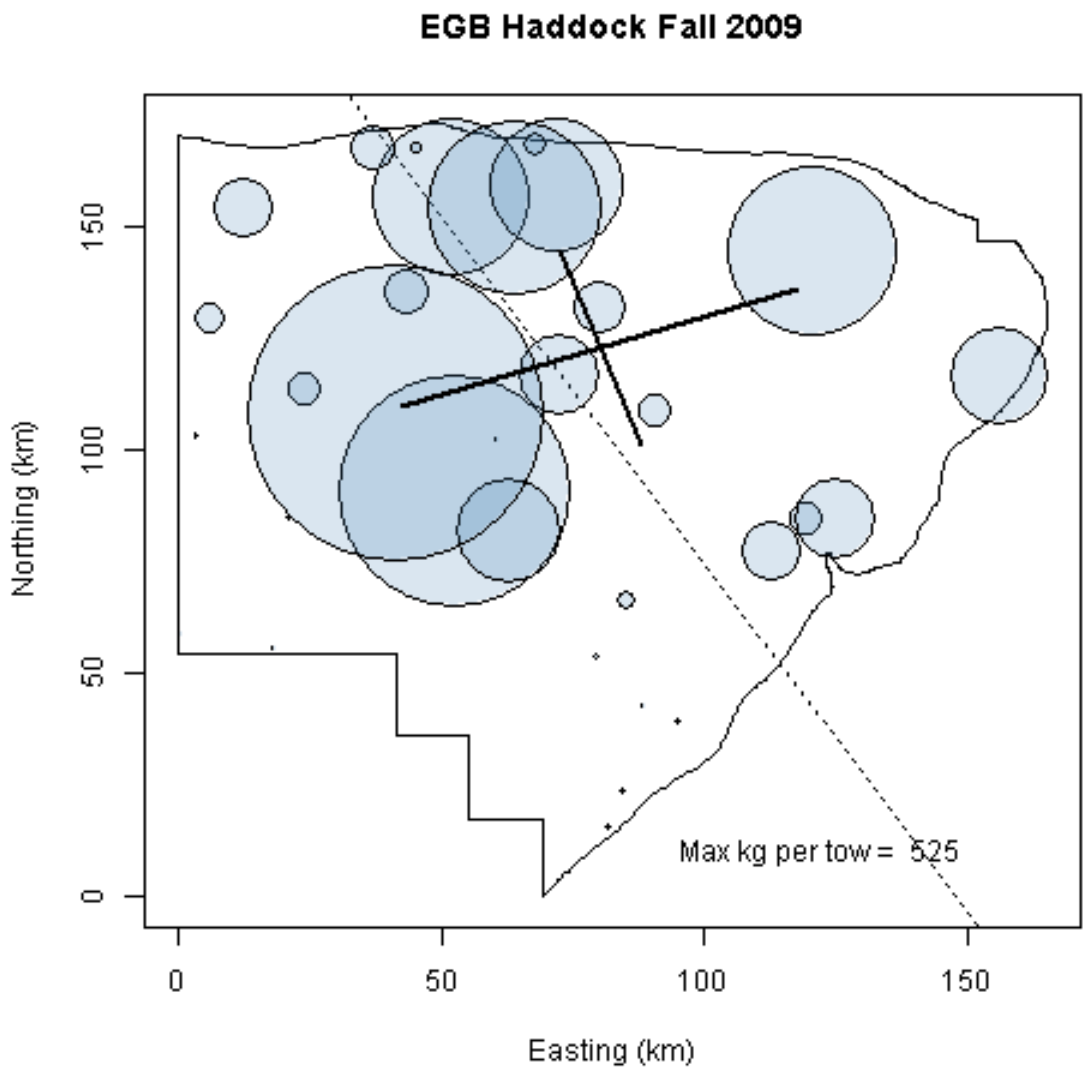

EGB Haddock Fall 2004
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 613

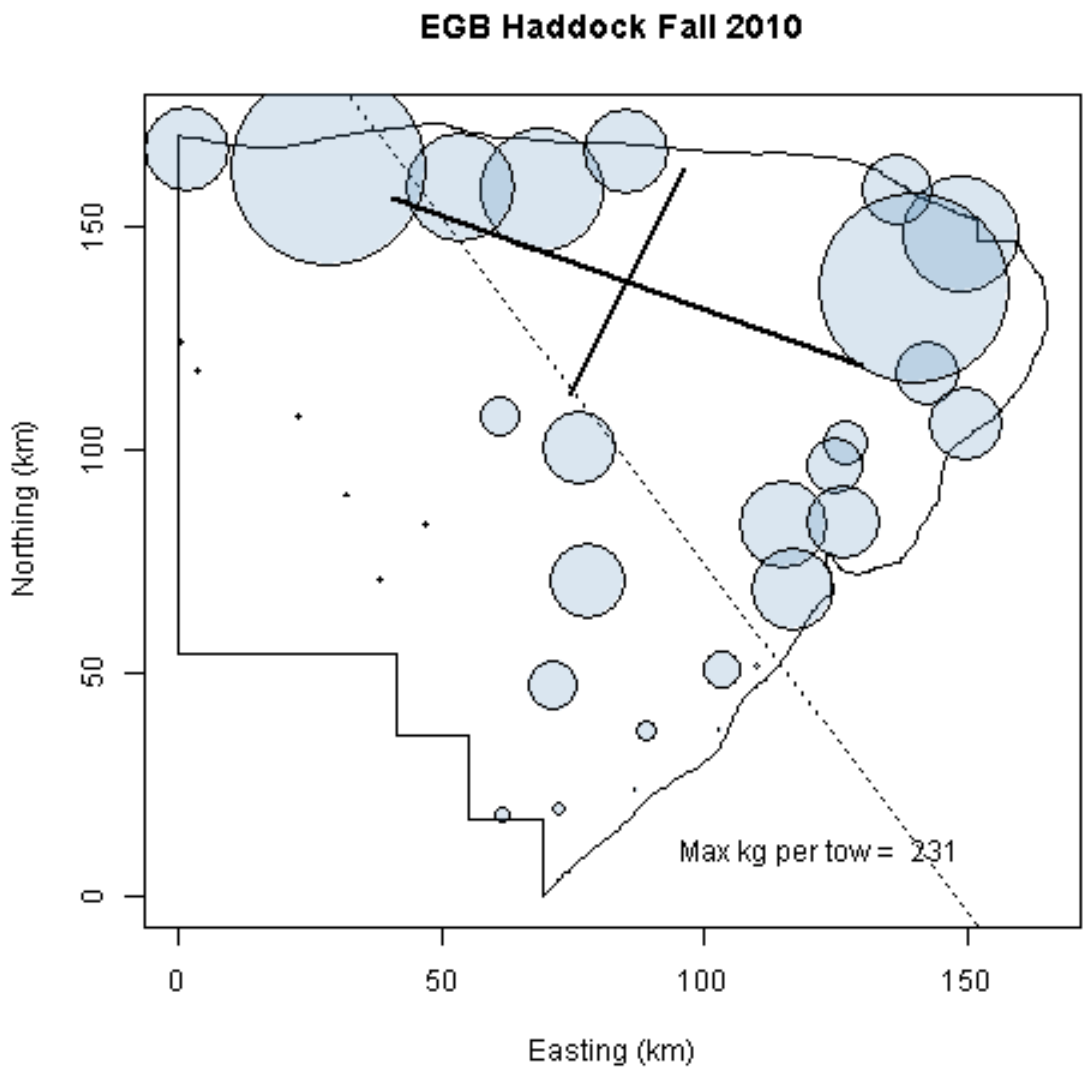

EGB Haddock Fall 2005
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 1336

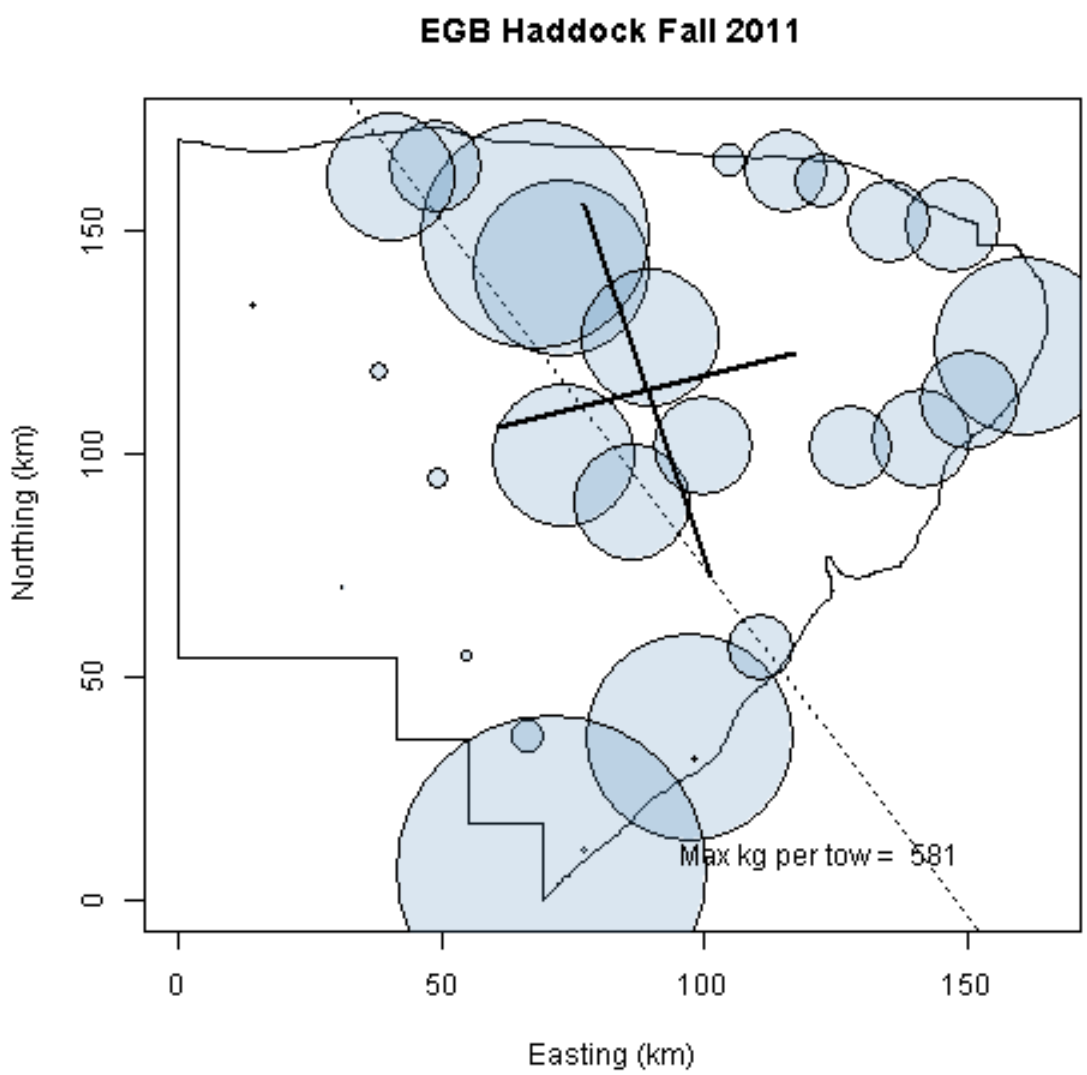

EGB Haddock Fall 2006
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 975

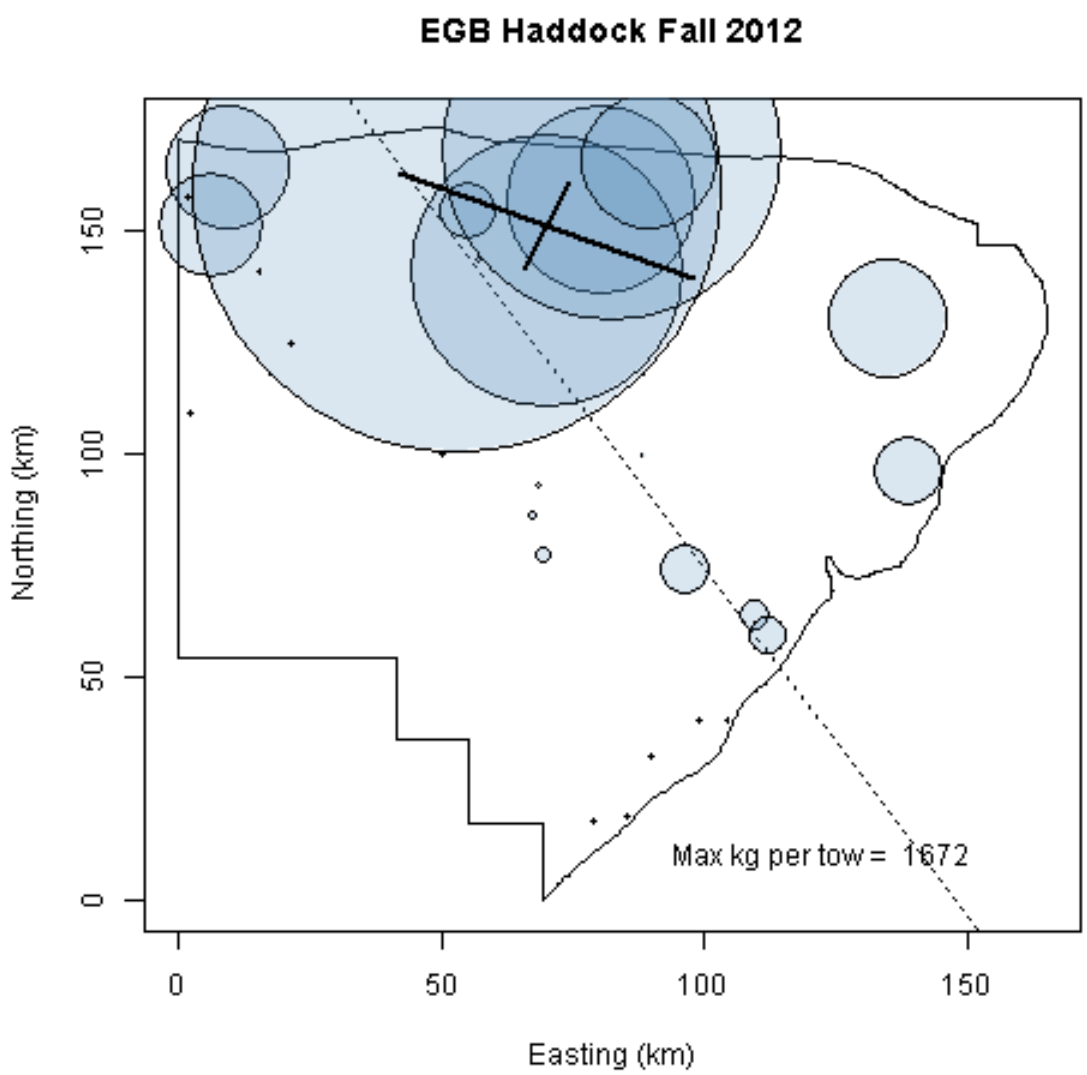

EGB Haddock Fall 2007
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 2854

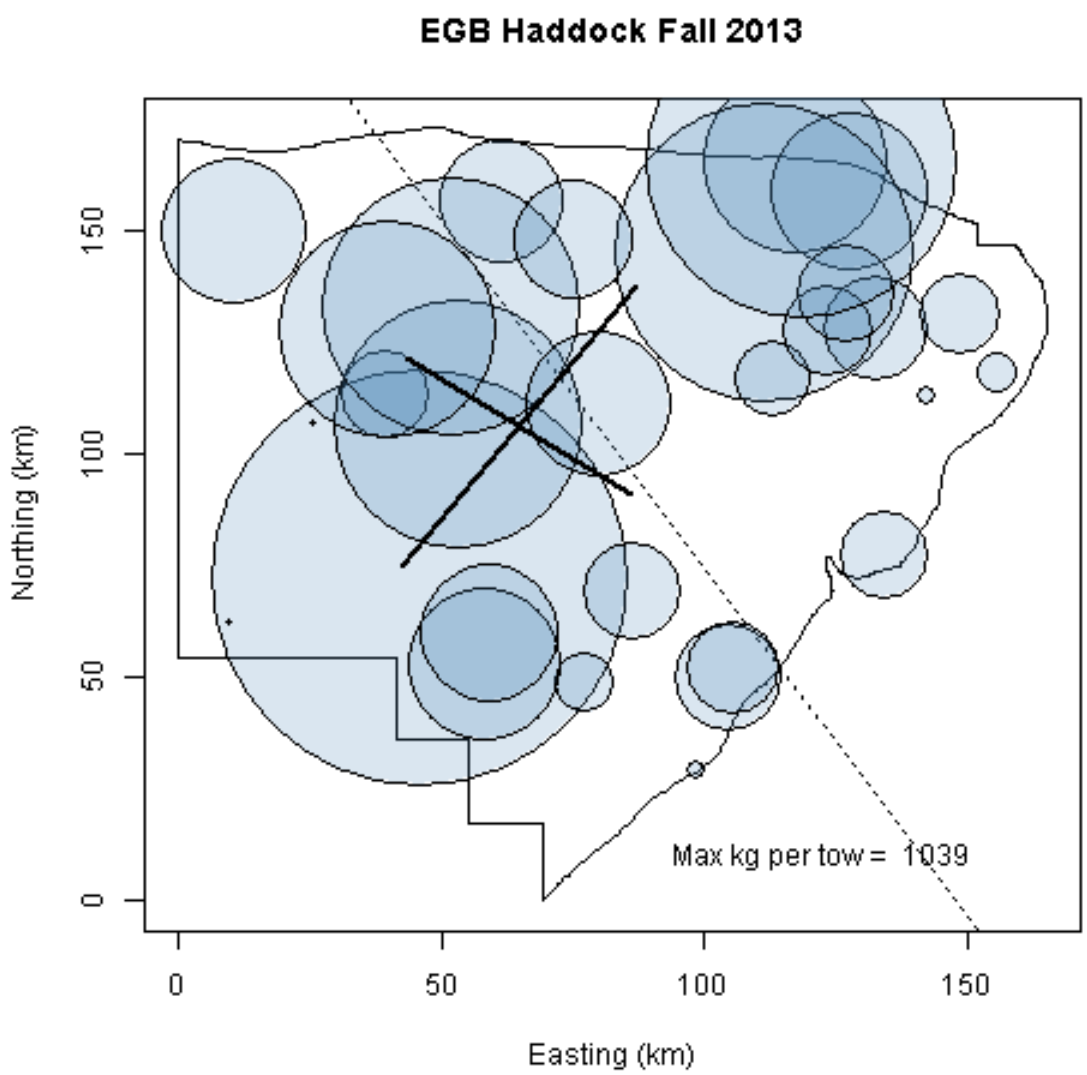

EGB Haddock Fall 2008
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 808

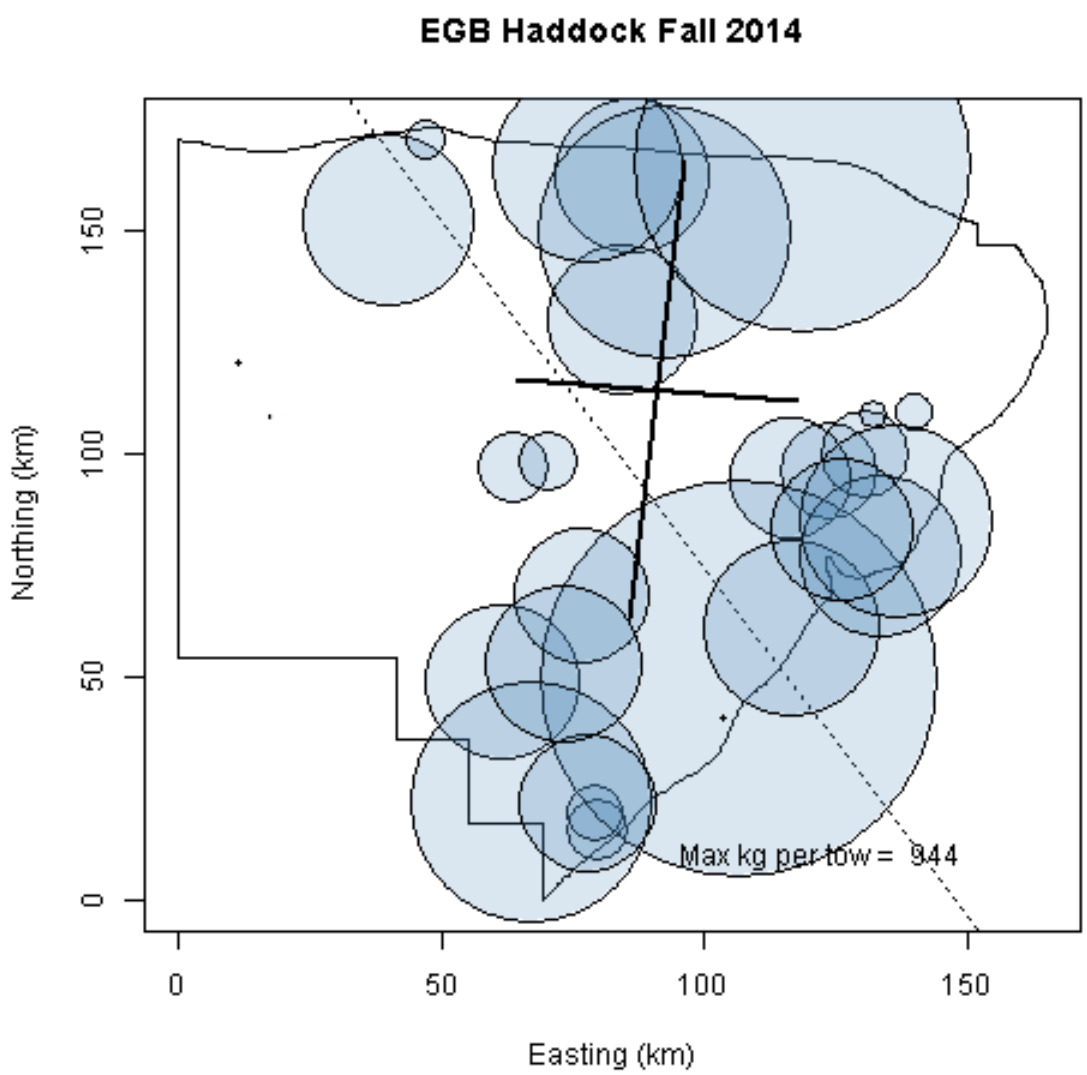

EGB Haddock Fall 2009
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 525

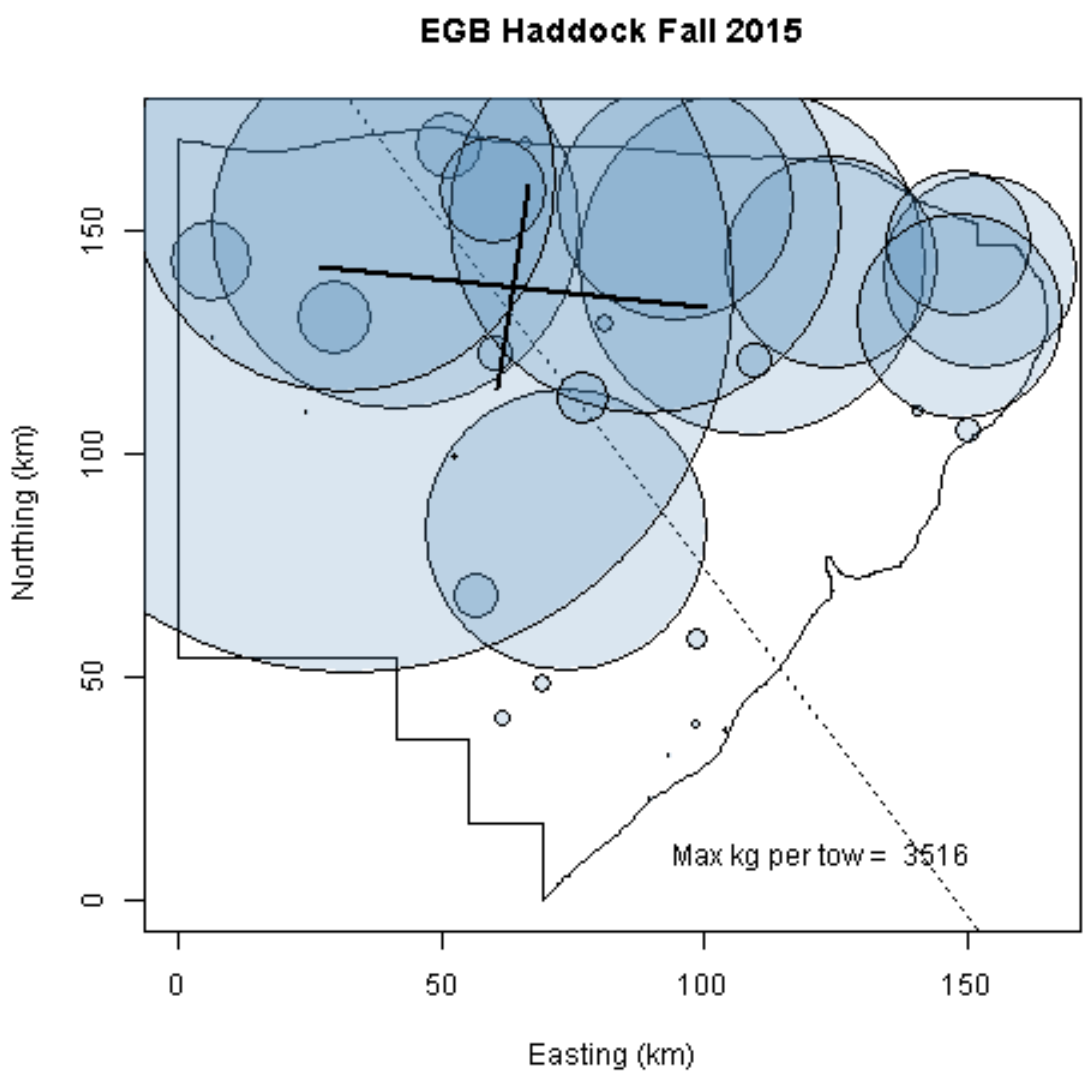

EGB Haddock Fall 2010
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 231

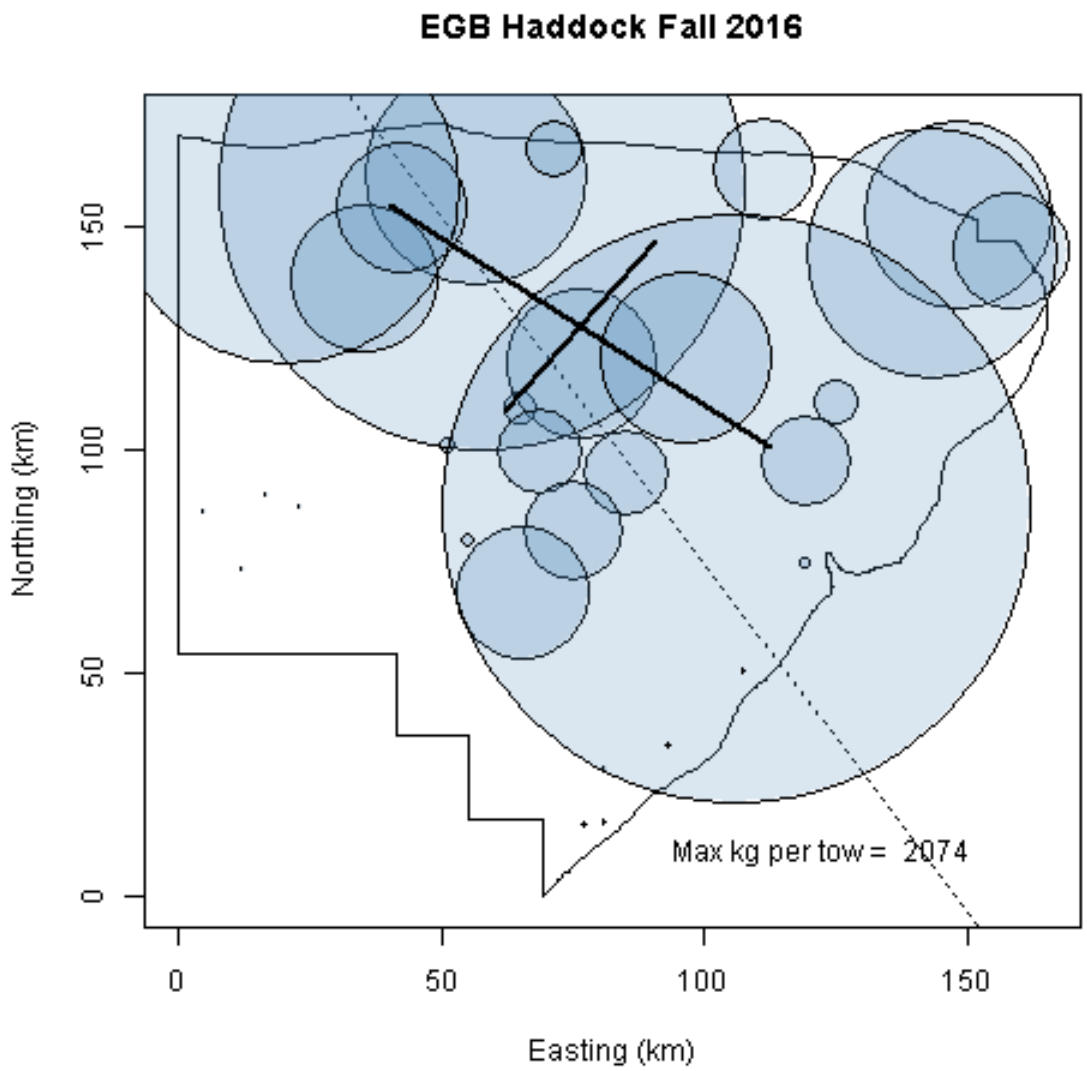

EGB Haddock Fall 2011
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 581

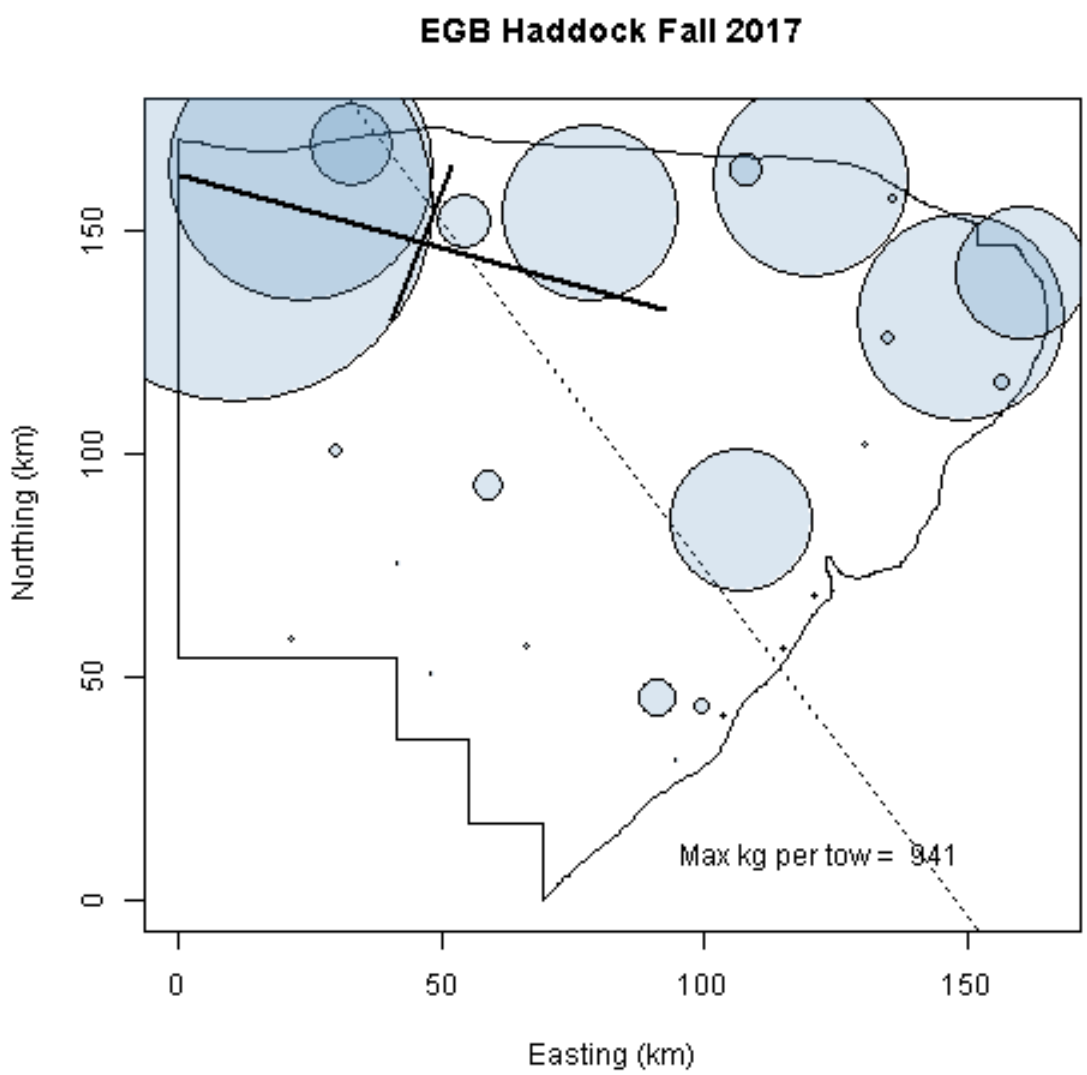

EGB Haddock Fall 2012
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 1672


EGB Haddock Fall 2013
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 1039

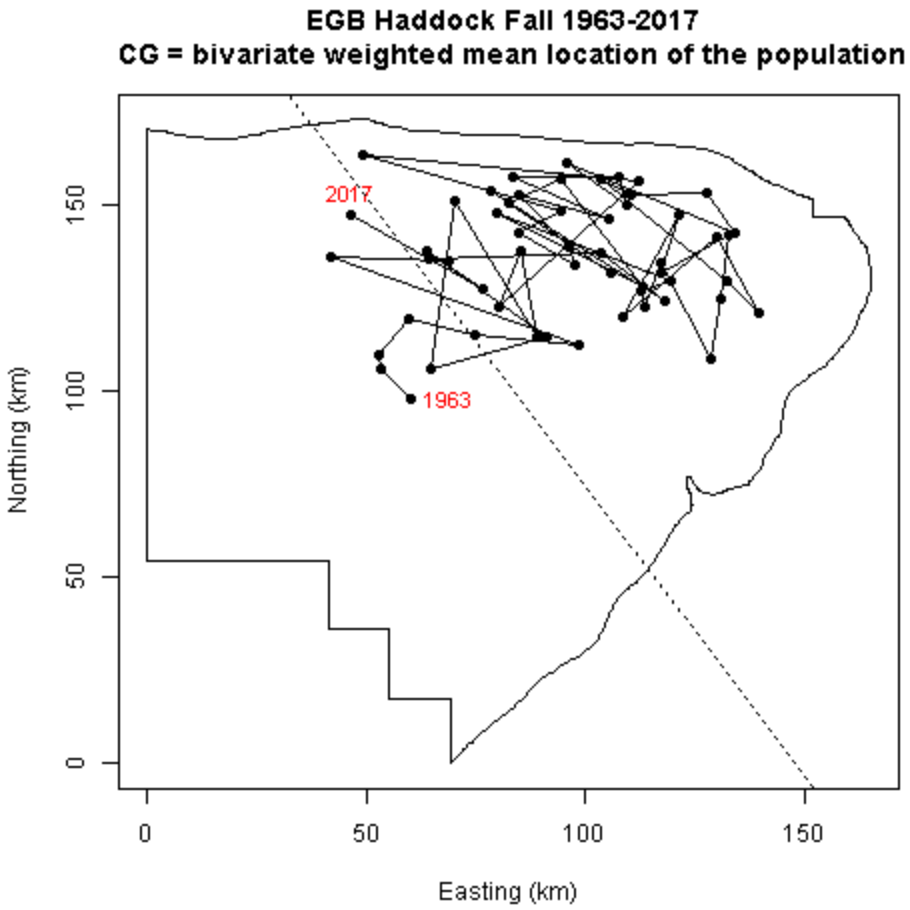

EGB Haddock Fall 2014
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 944


EGB Haddock Fall 2015
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 3516

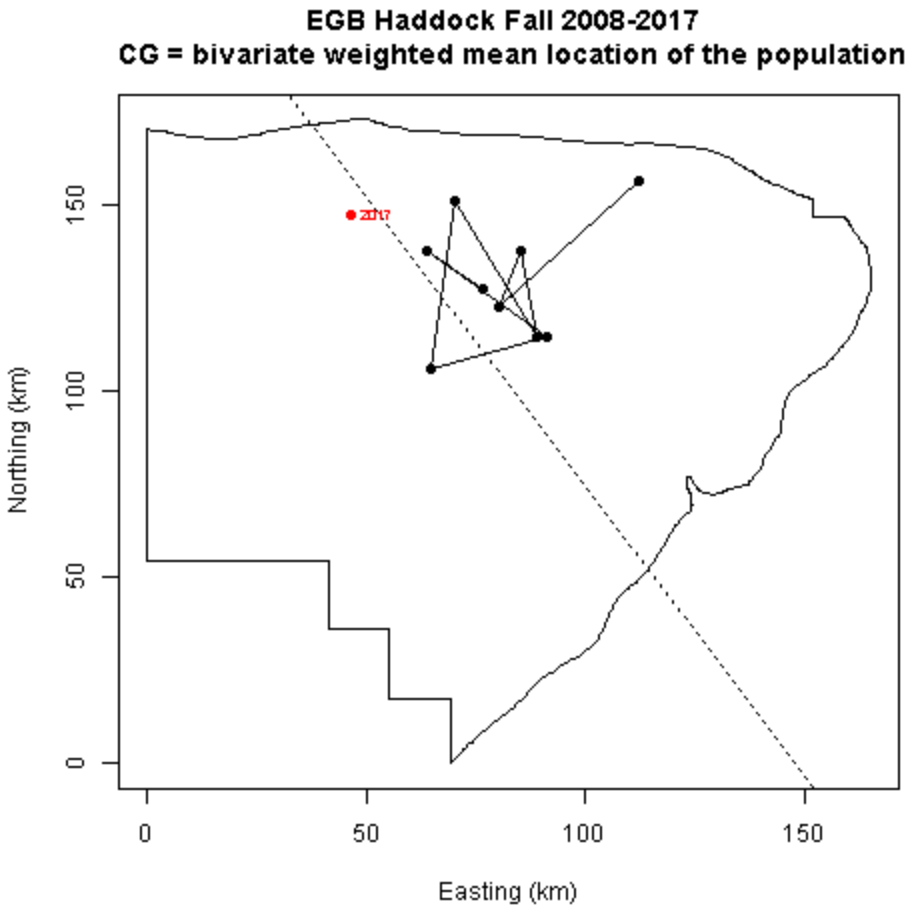

EGB Haddock Fall 2016
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 2074

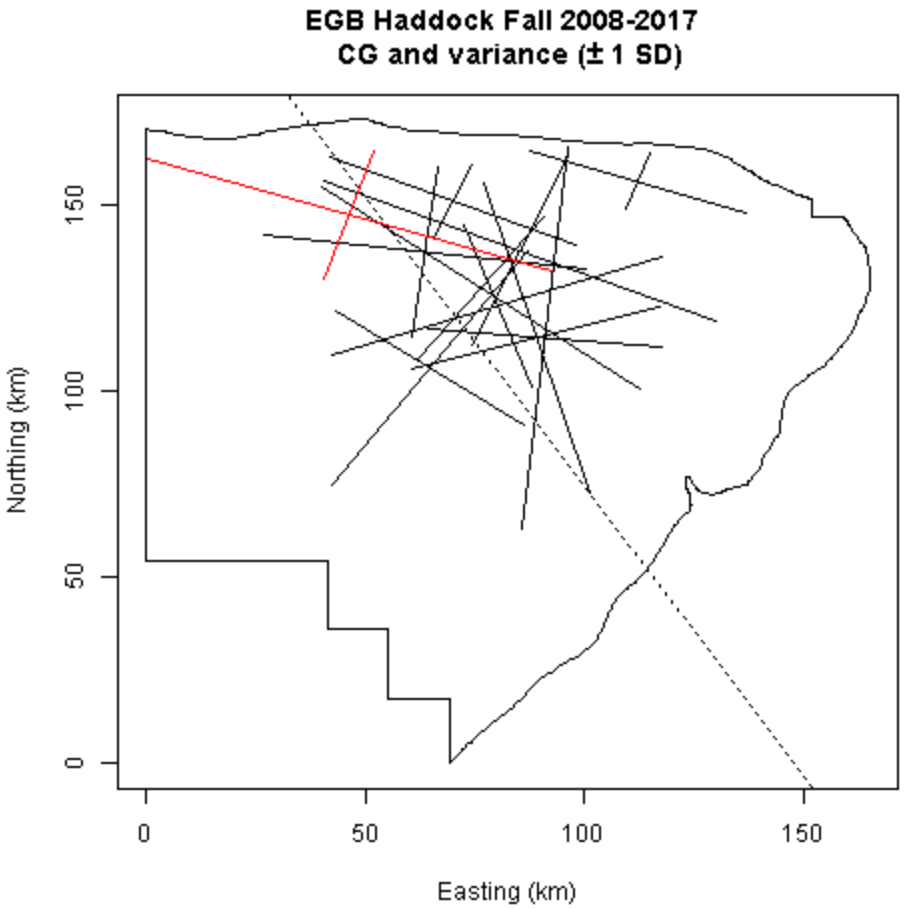

EGB Haddock Fall 2017
Northing (km)
Easting (km)
0
50
100
150
0
50
100
150
Max kg per tow = 941

Results: EGB Haddock

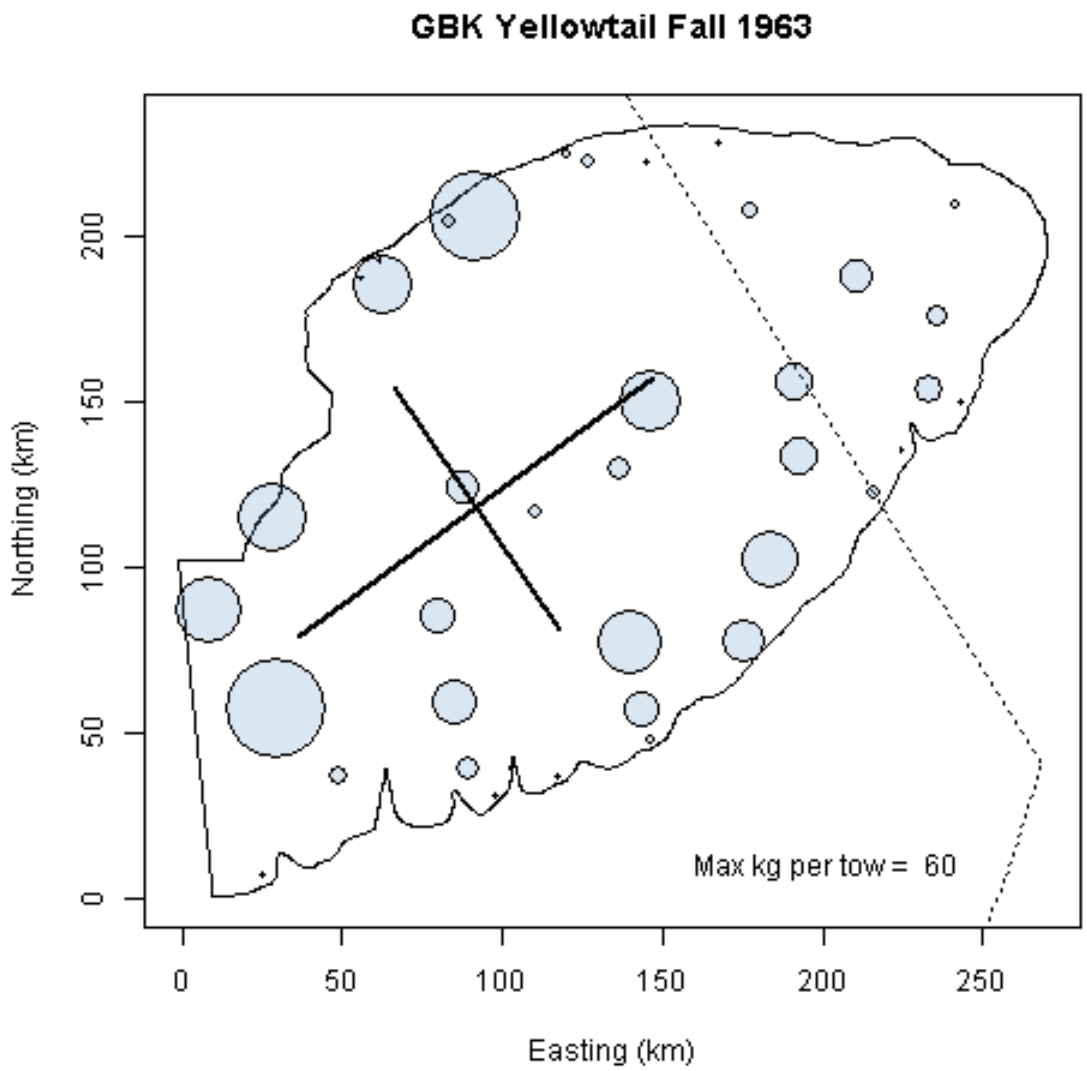


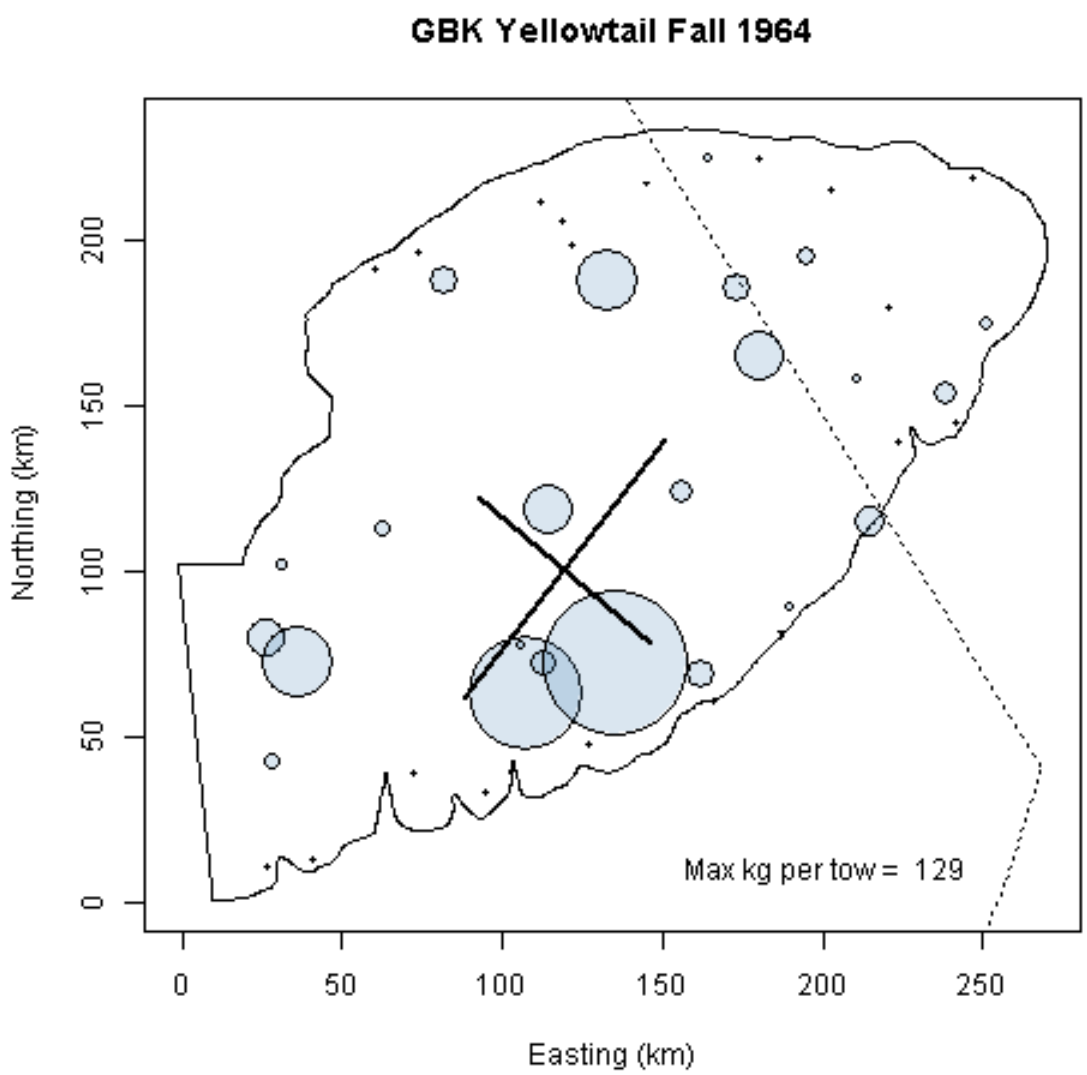
Results: EGB Haddock

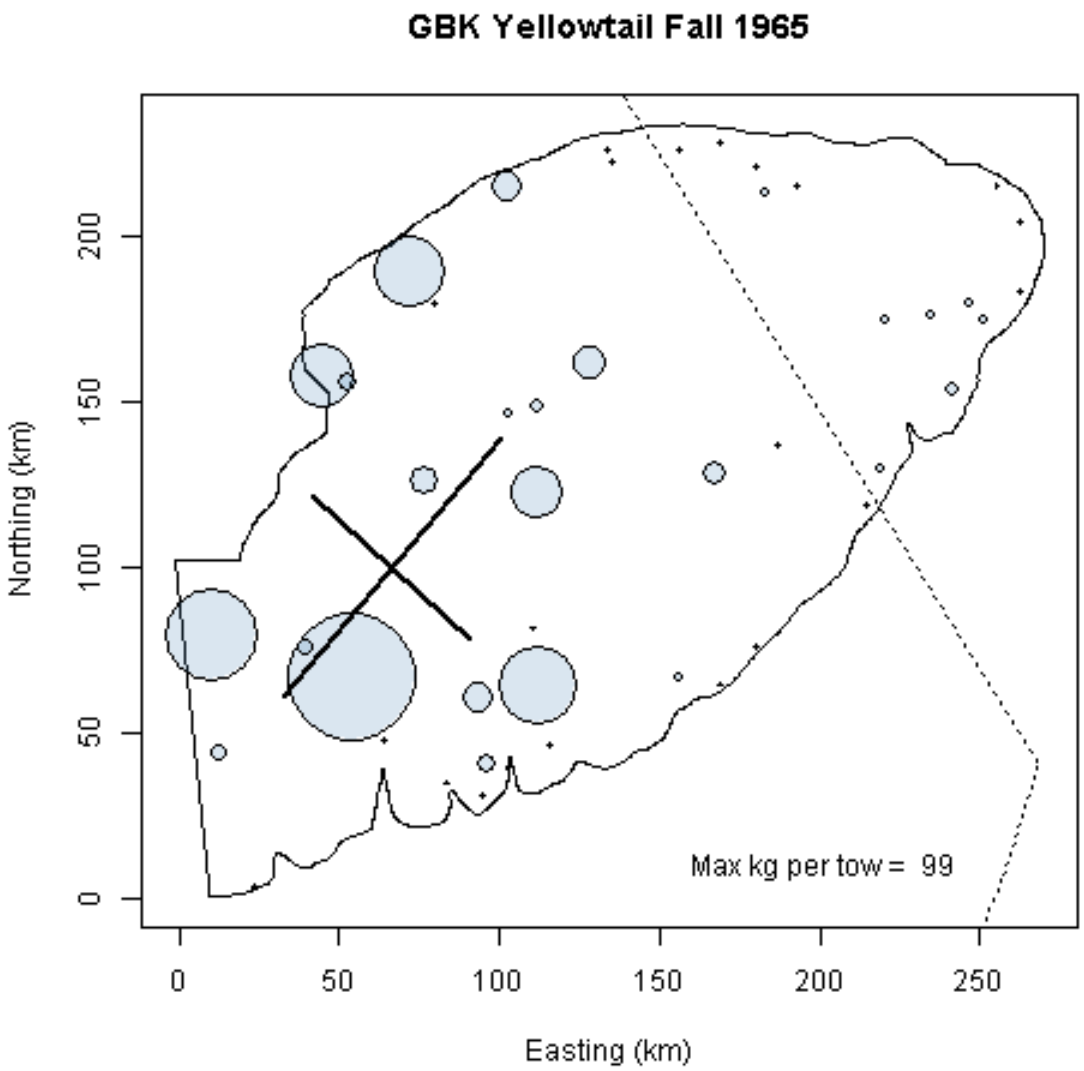


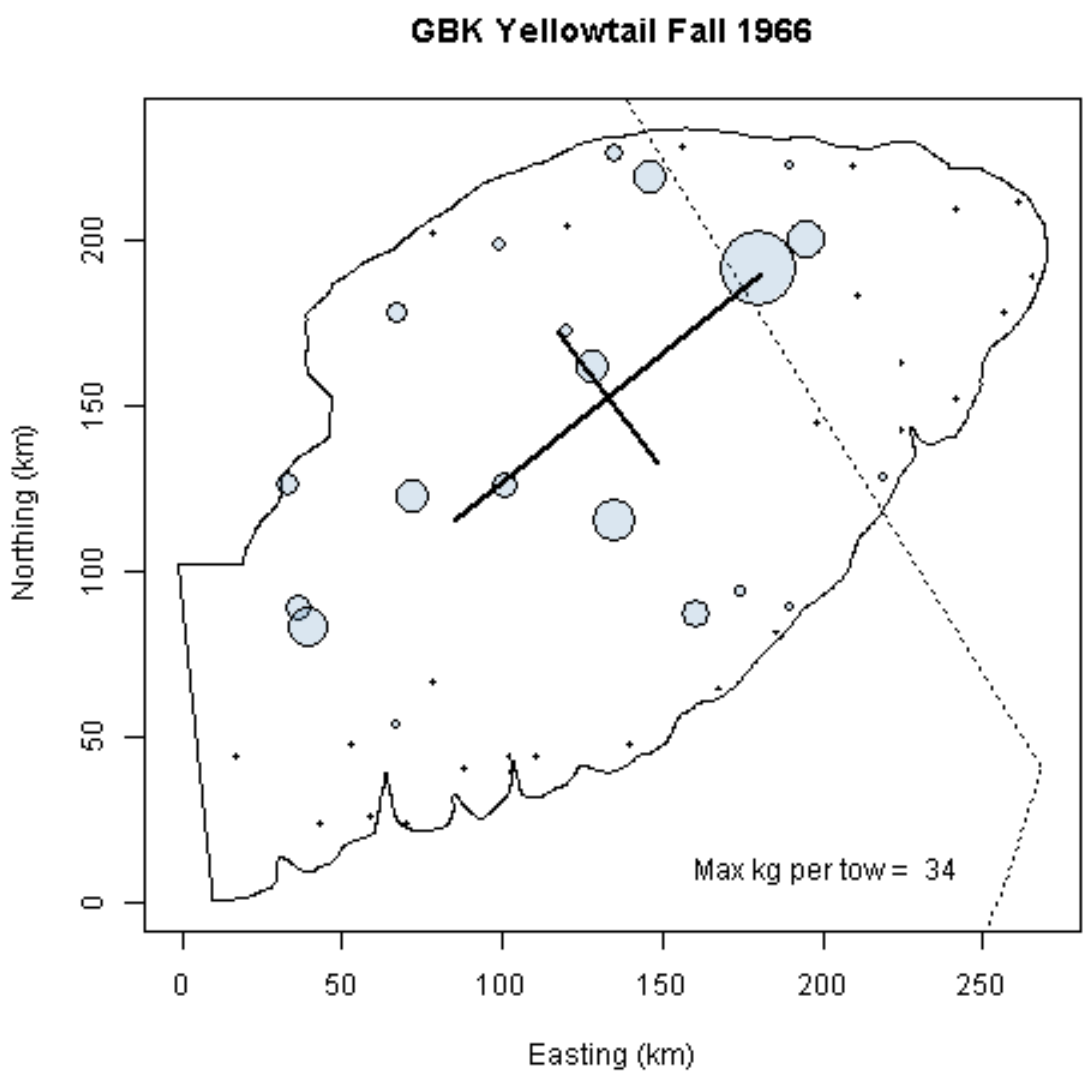


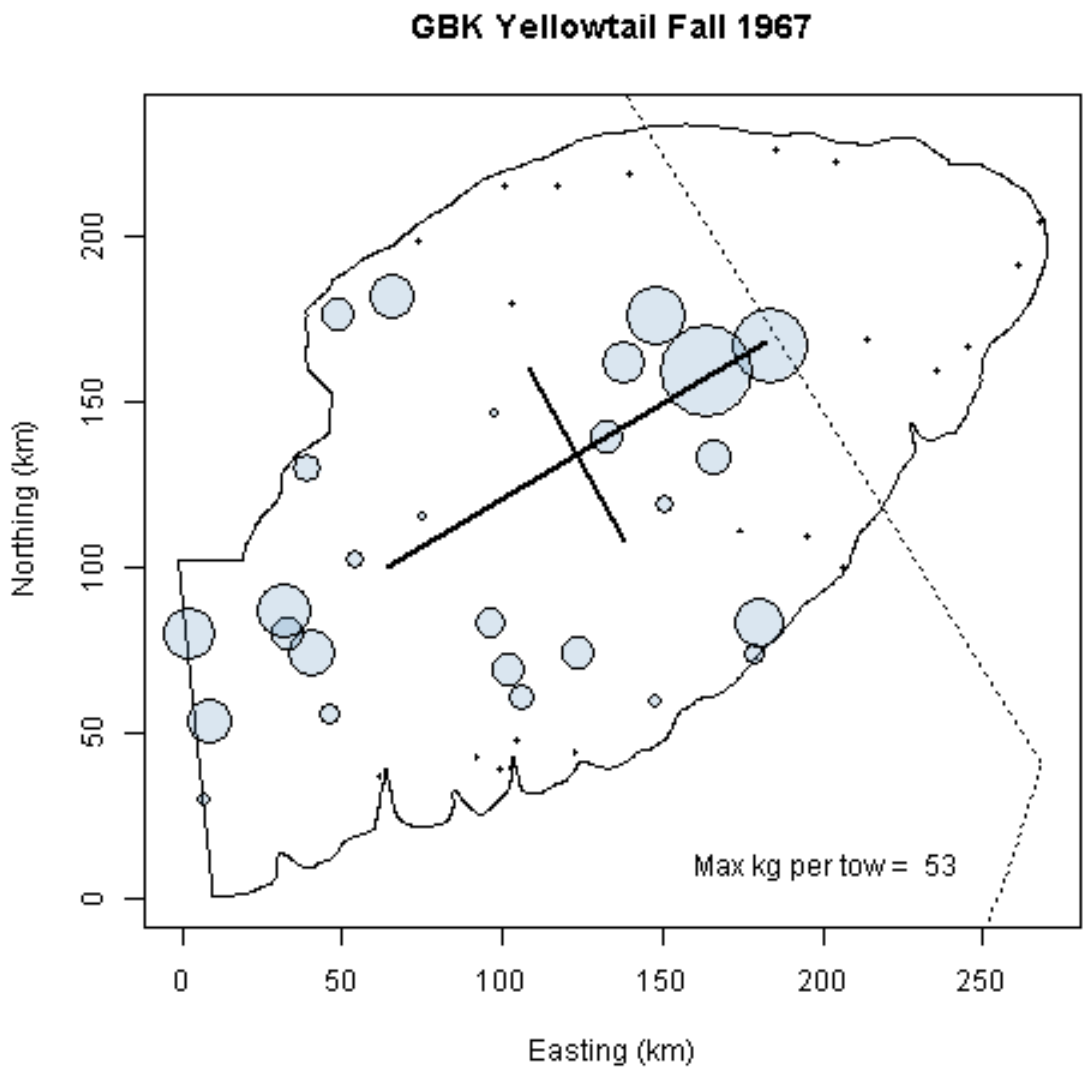
CG Maps: GB Yellowtail Flounder

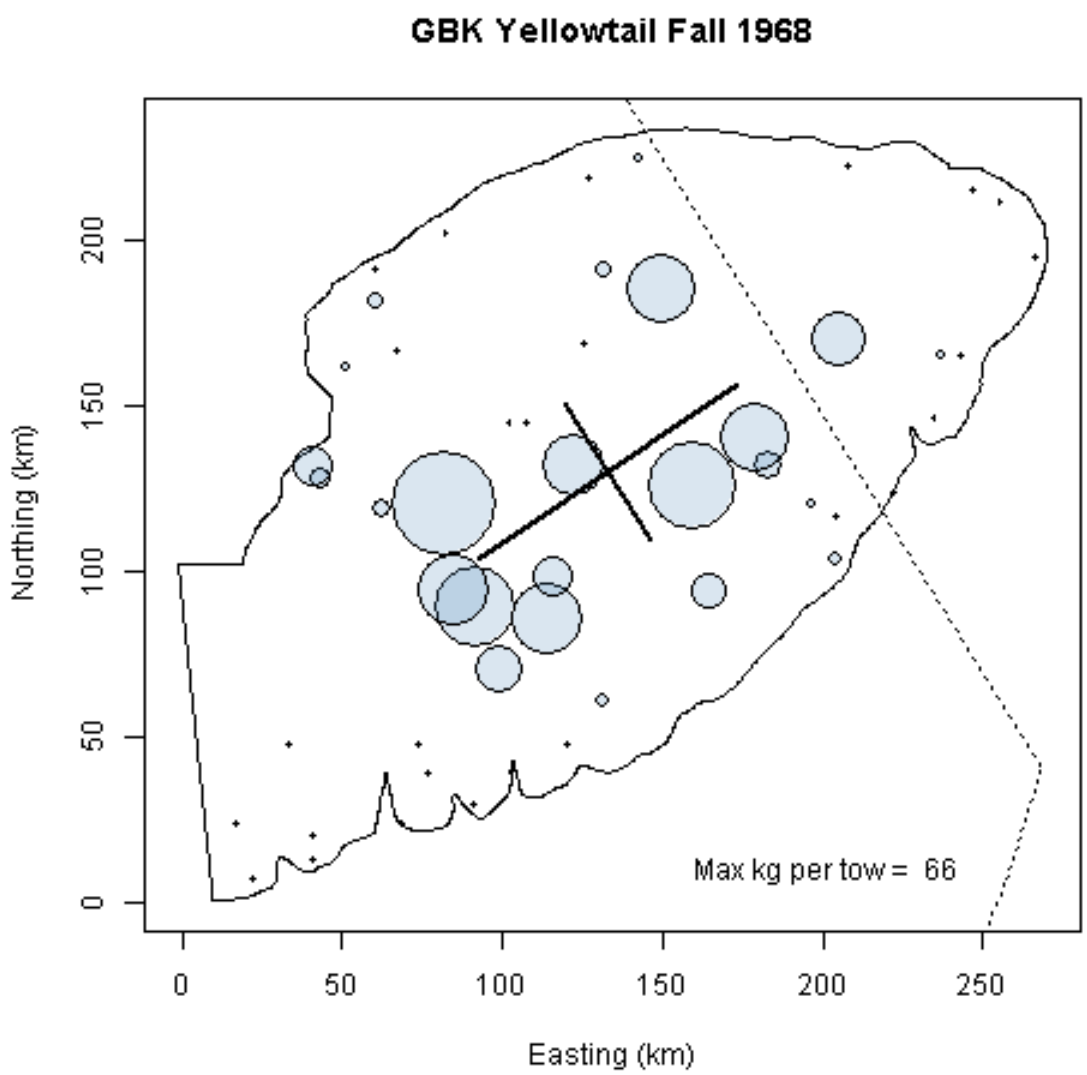

GBK Yellowtail Fall 1963
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 60

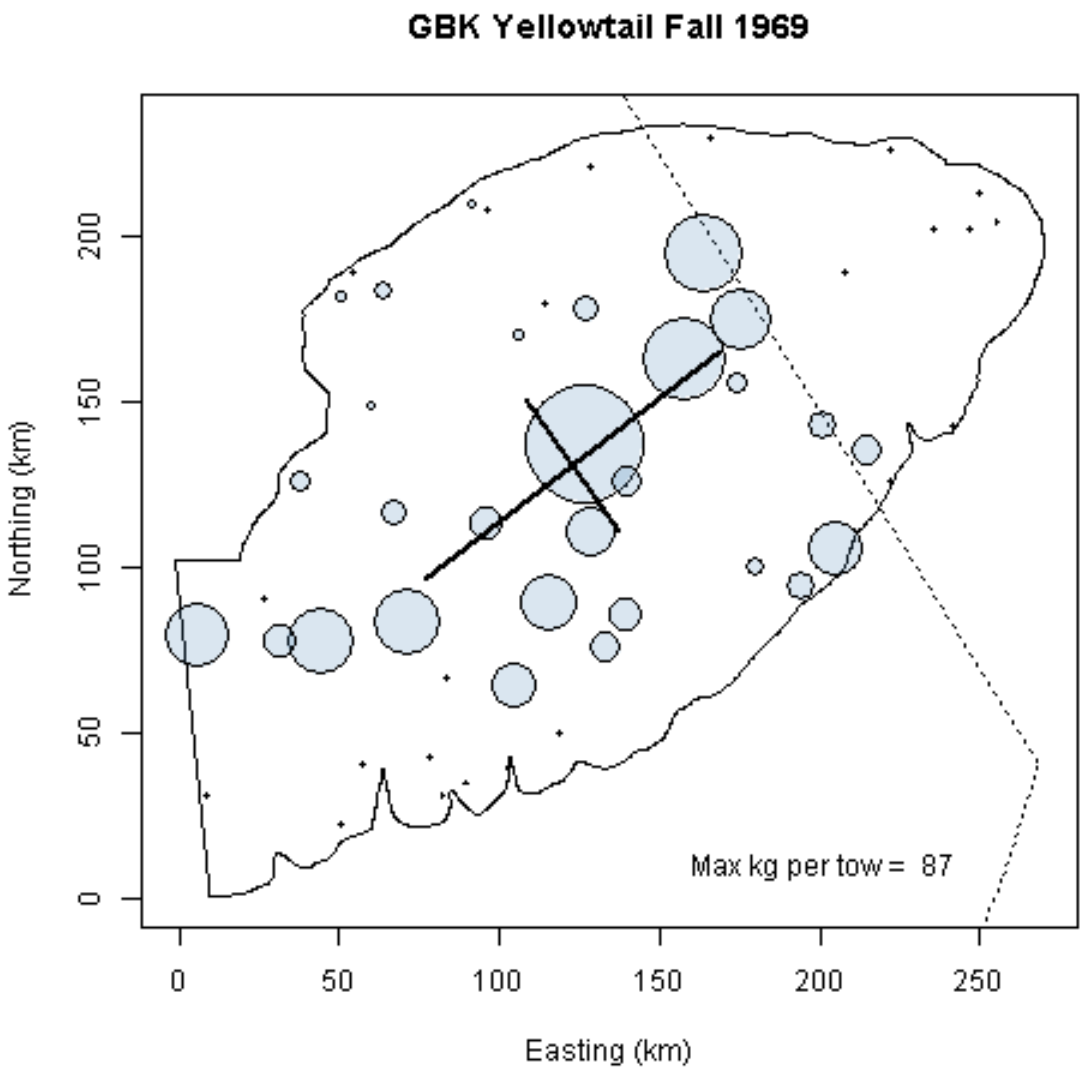

GBK Yellowtail Fall 1964
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 129

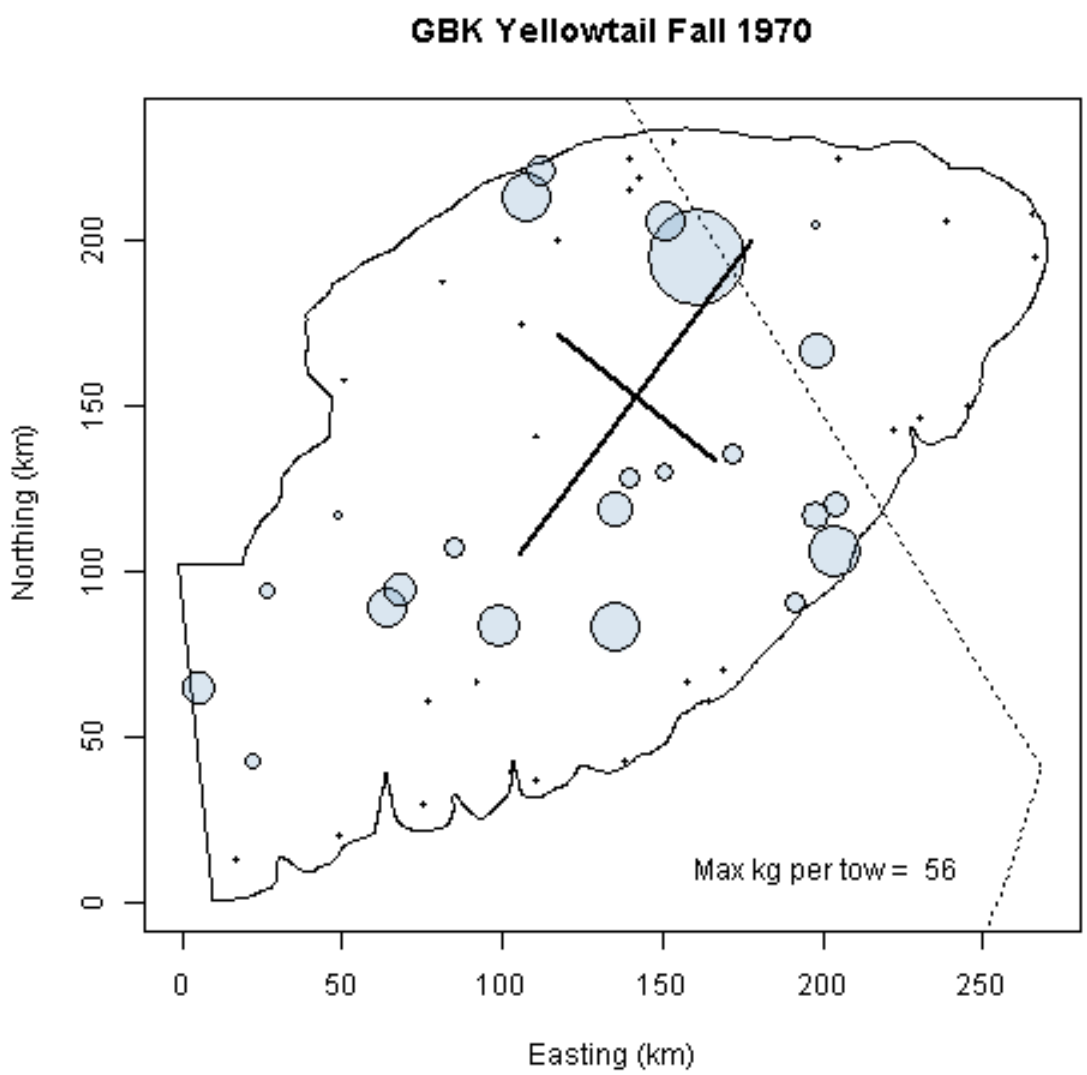

GBK Yellowtail Fall 1965
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 99

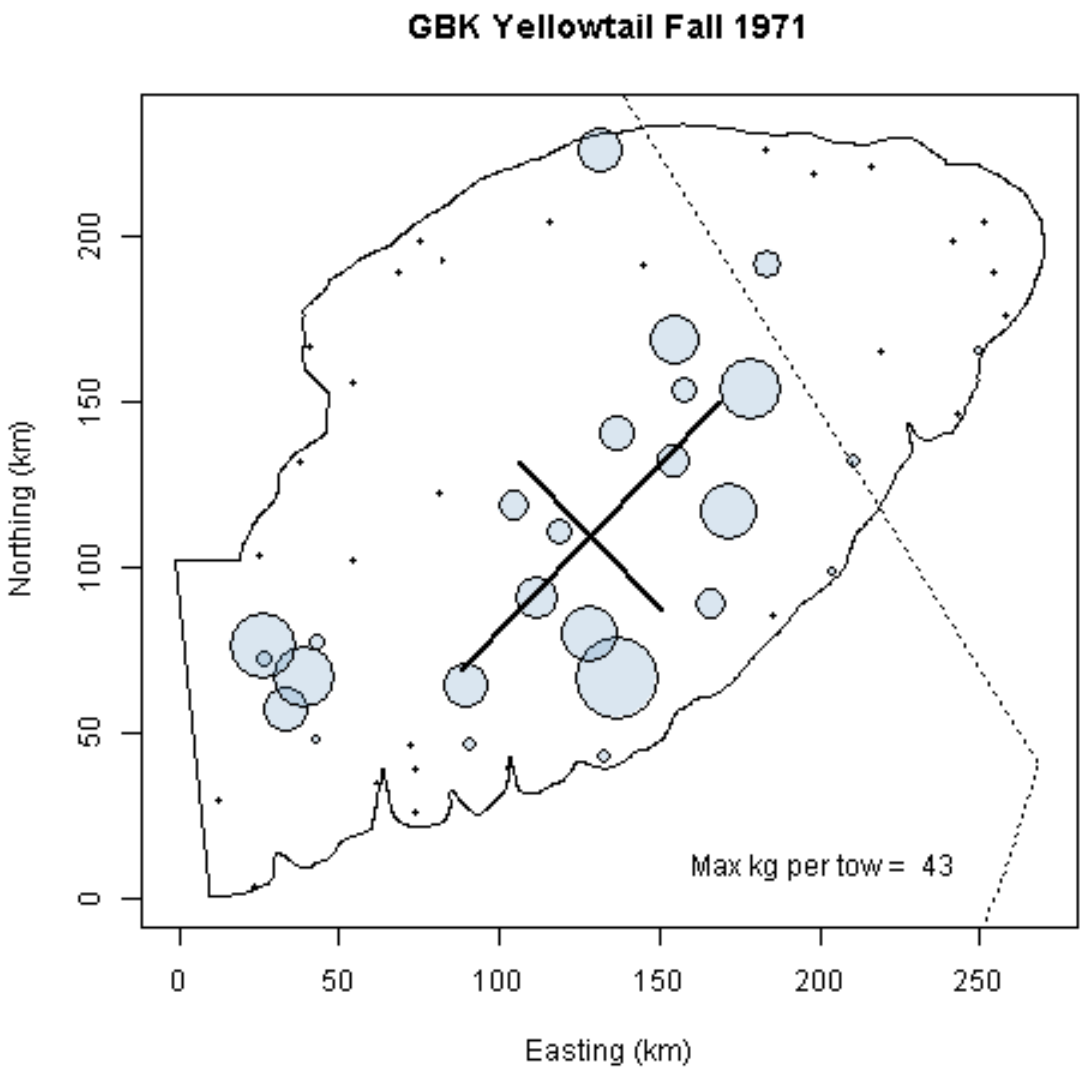

GBK Yellowtail Fall 1966
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 34

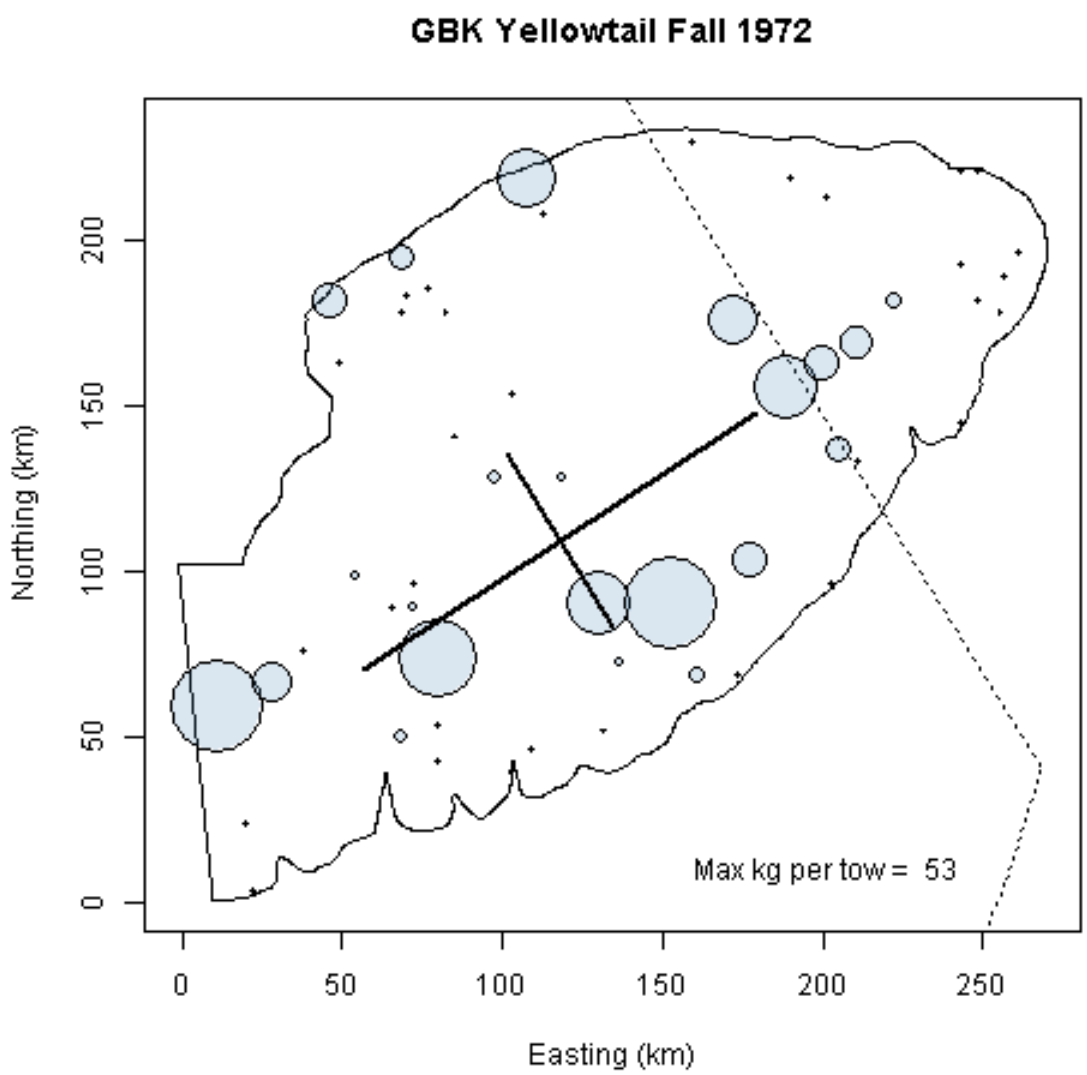

GBK Yellowtail Fall 1967
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 53

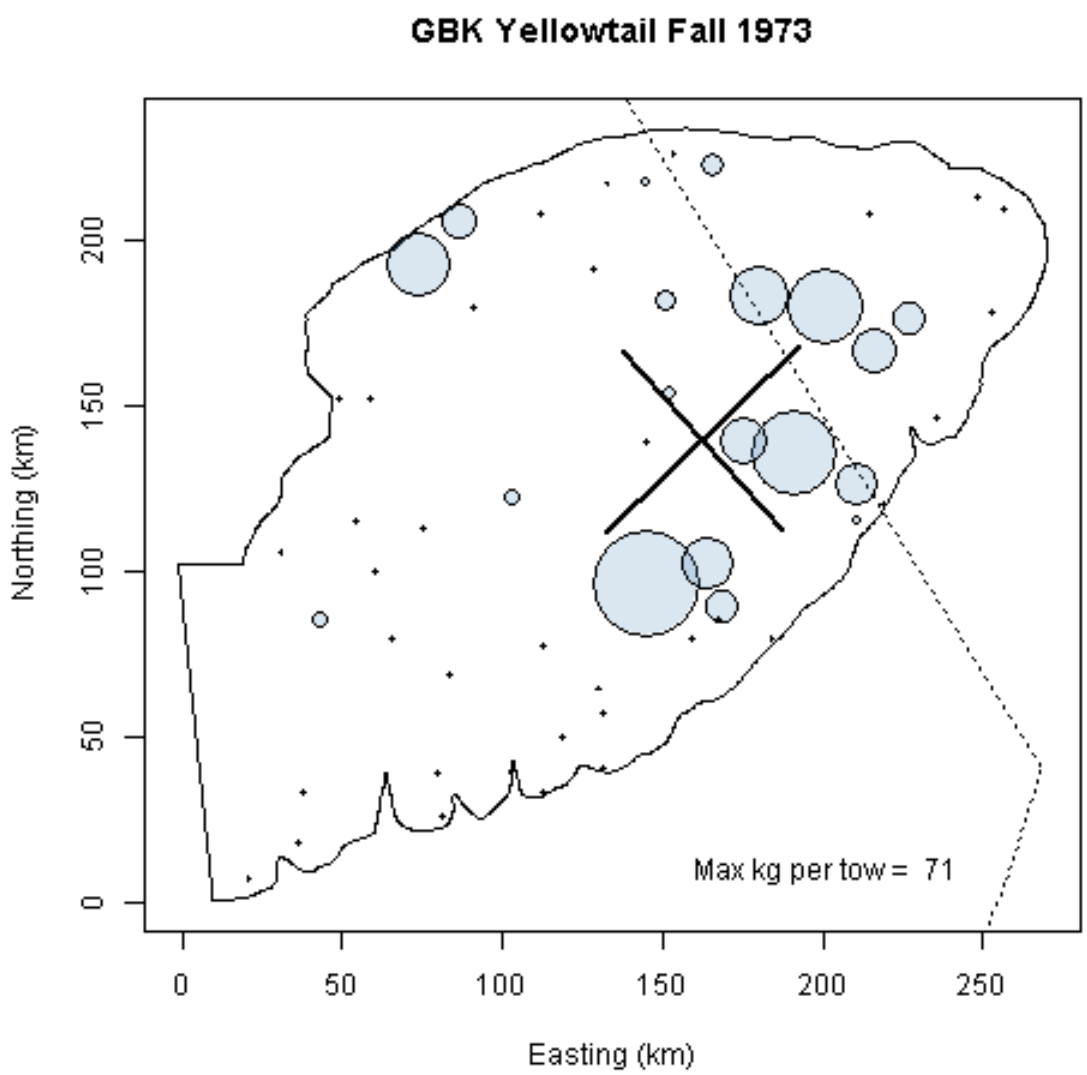

GBK Yellowtail Fall 1968
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 66

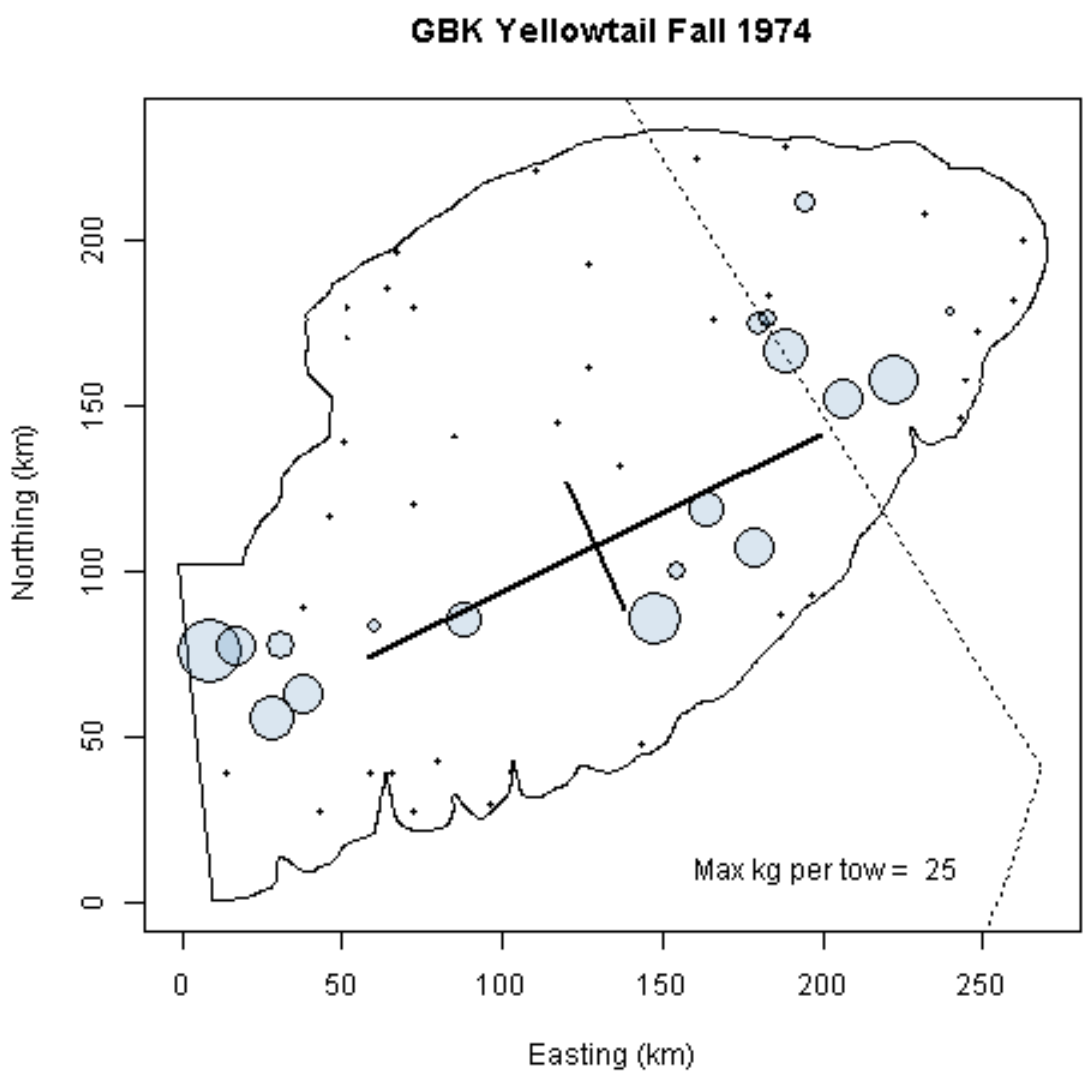

GBK Yellowtail Fall 1969
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 87

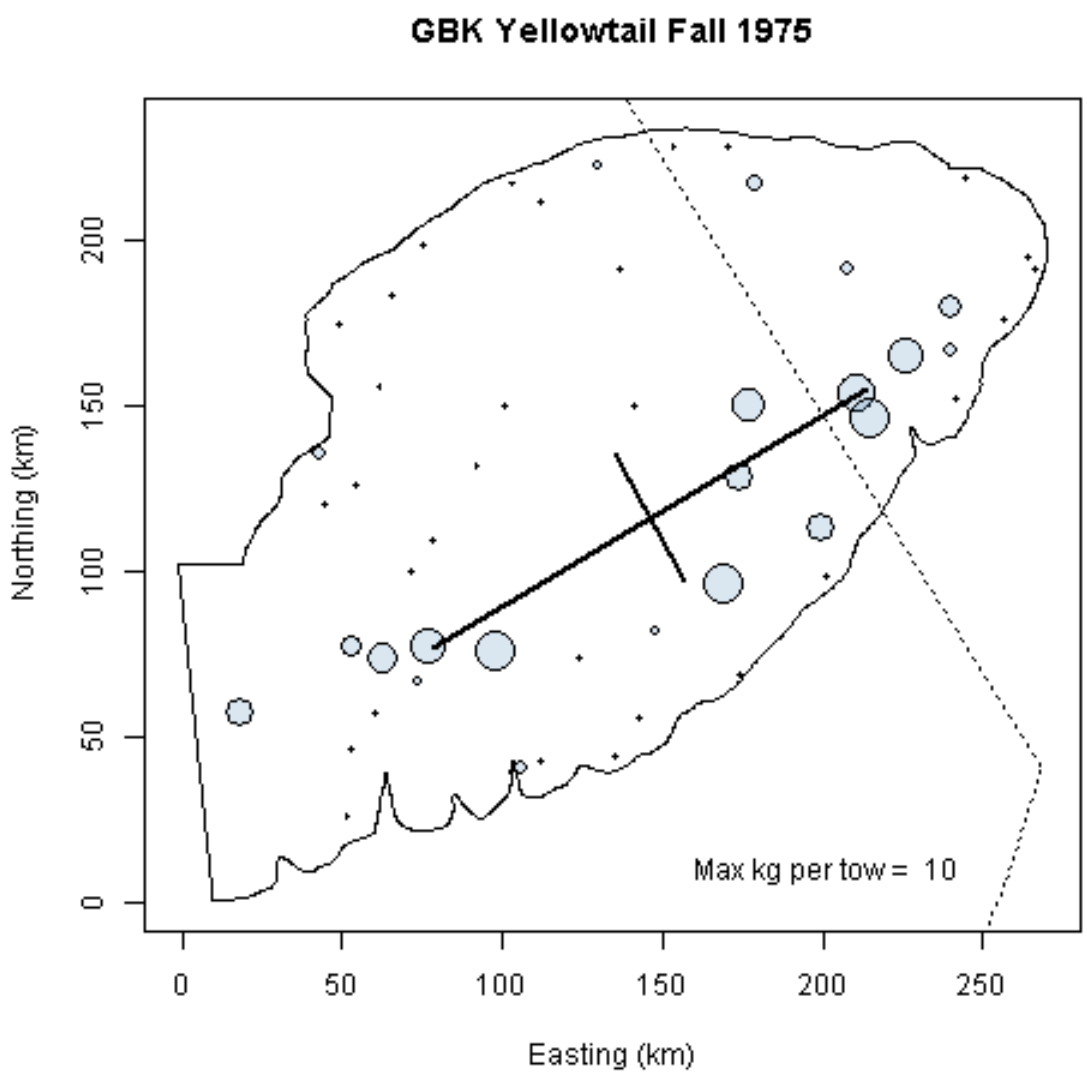

GBK Yellowtail Fall 1970
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 56

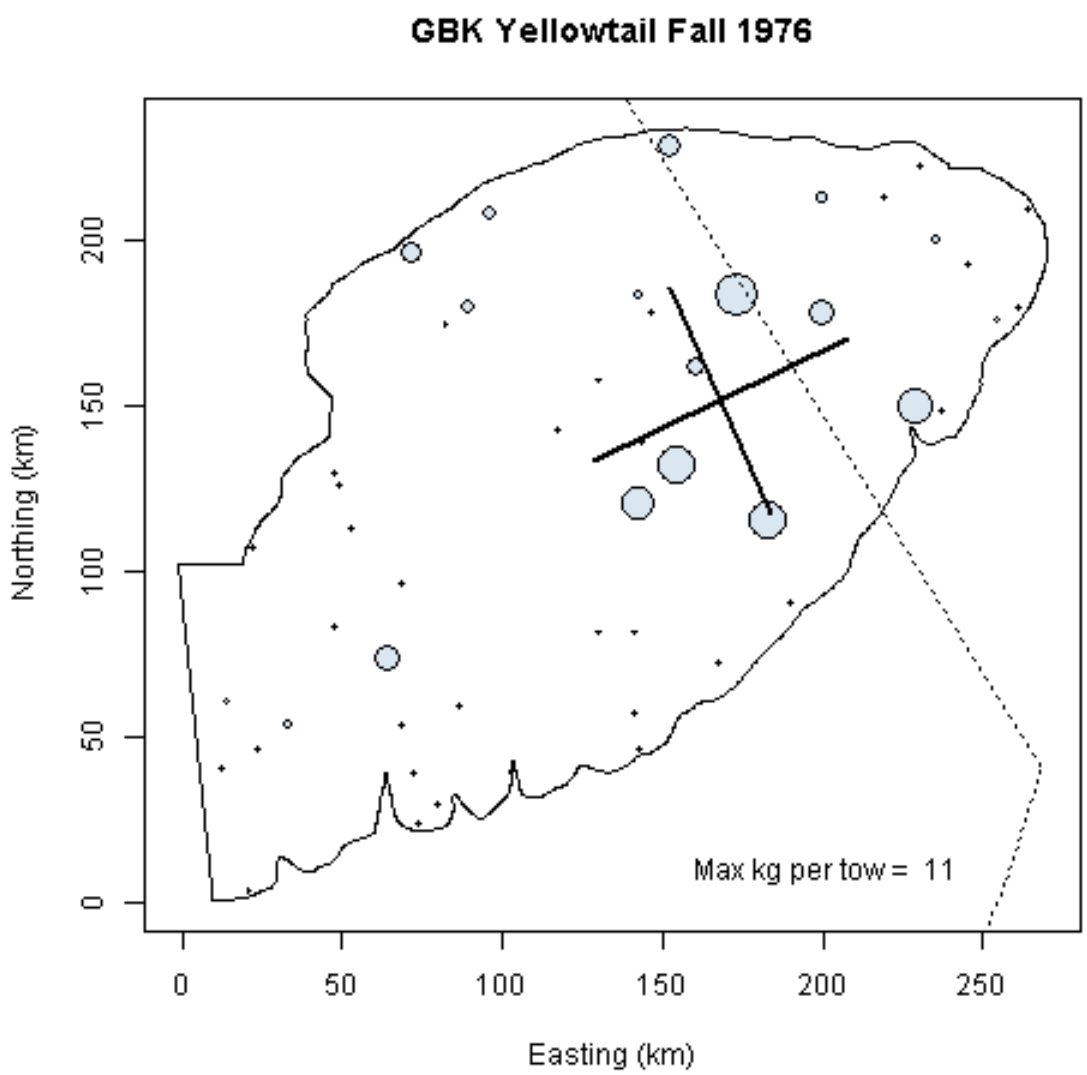

GBK Yellowtail Fall 1971
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 43

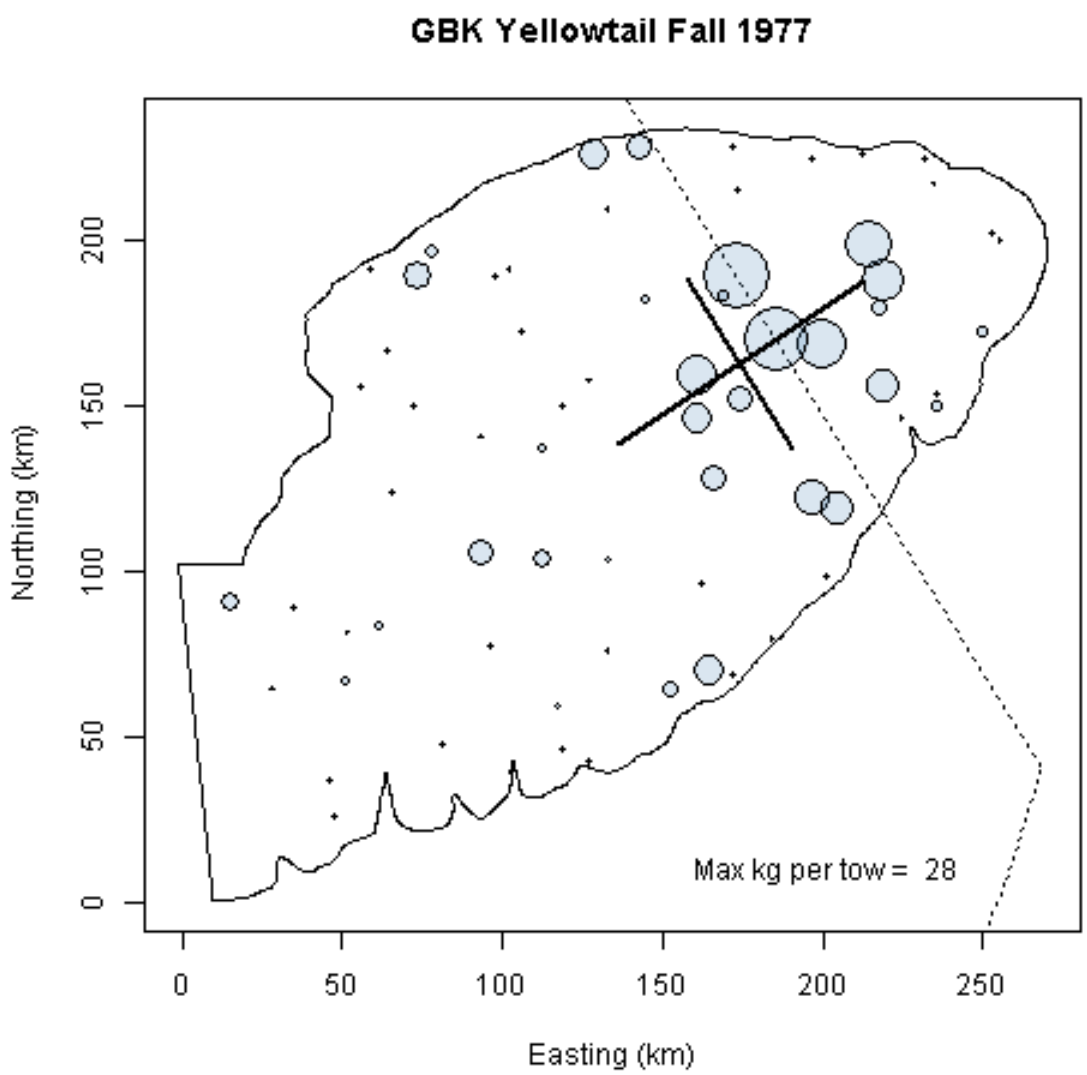

GBK Yellowtail Fall 1972
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 53

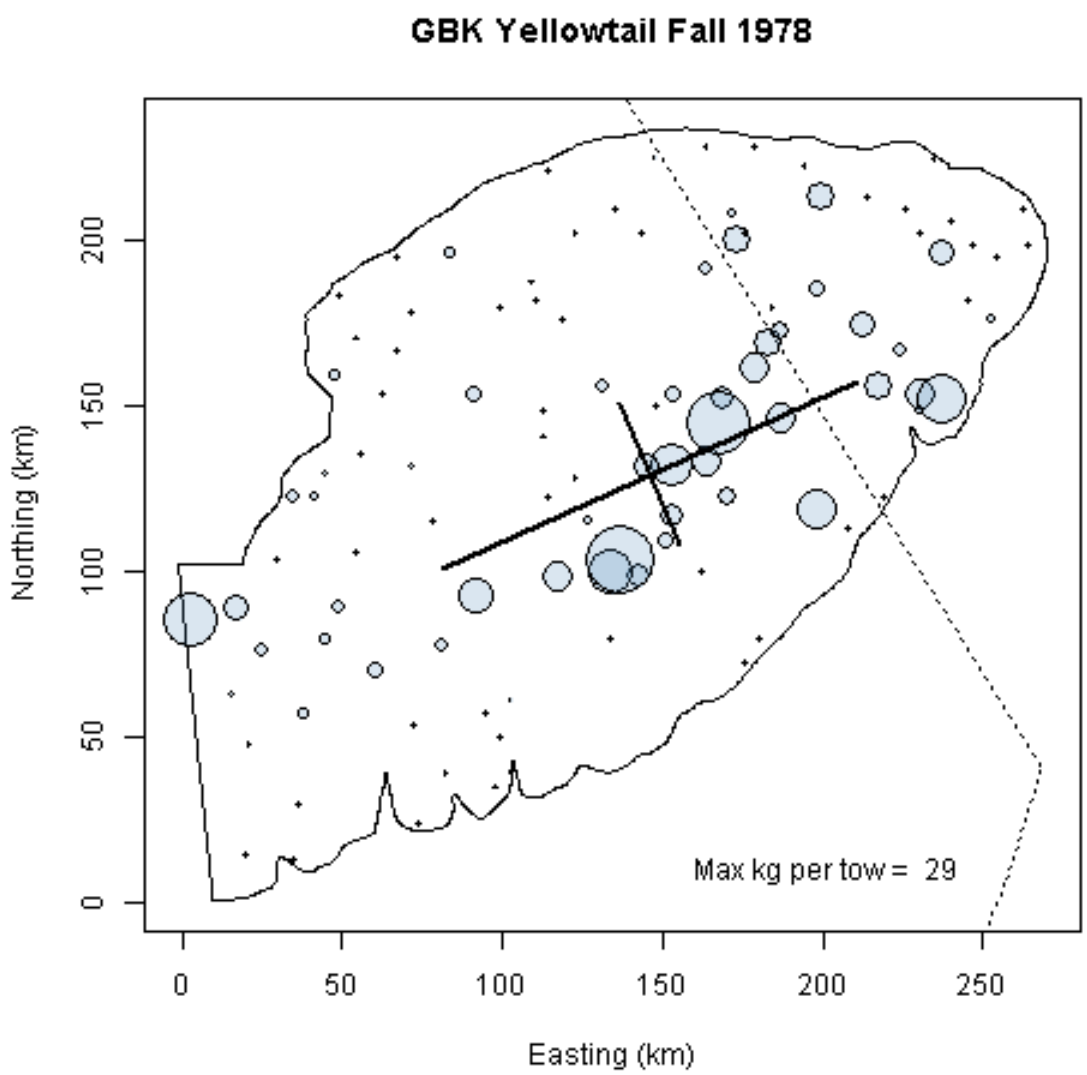

GBK Yellowtail Fall 1973
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 71

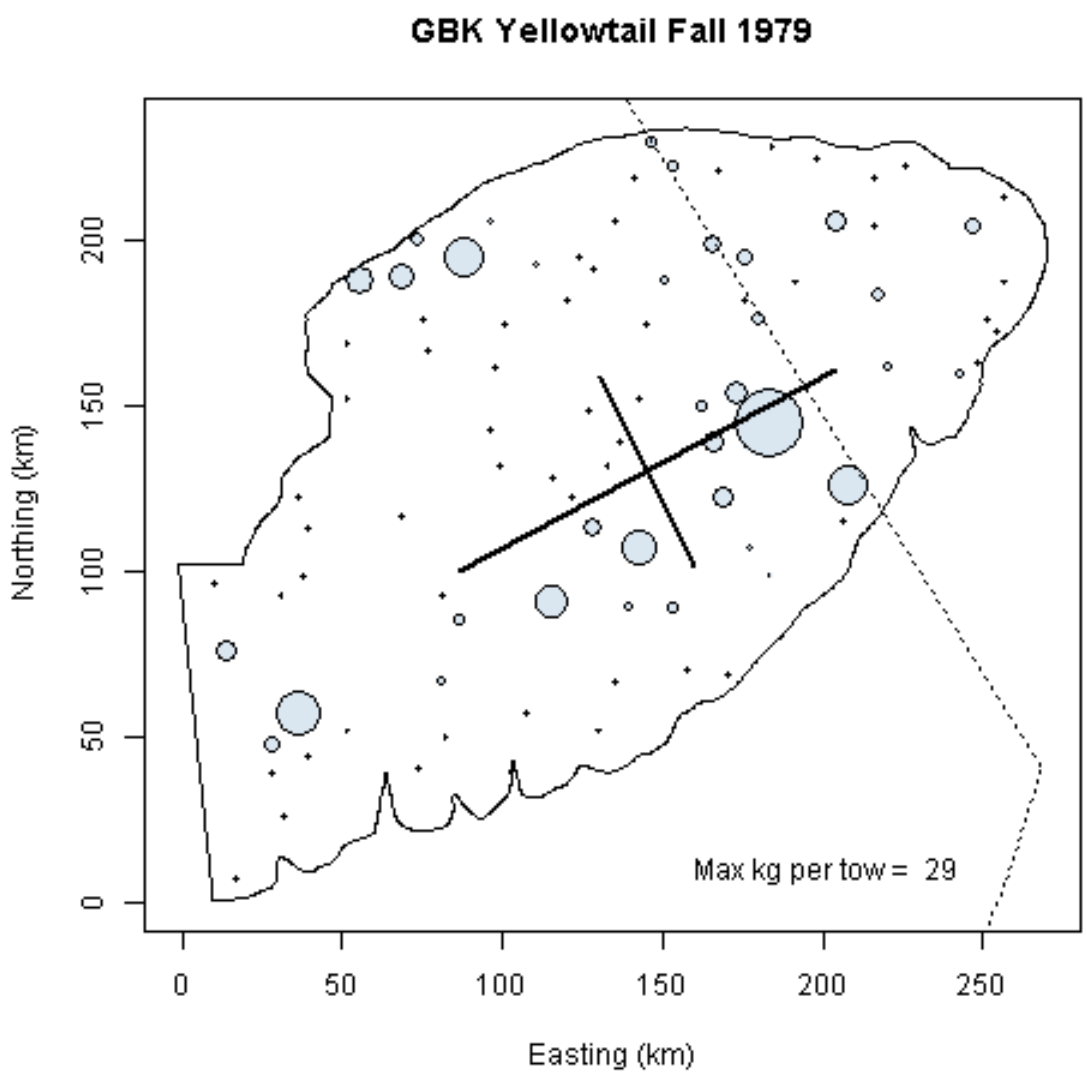

GBK Yellowtail Fall 1974
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 25

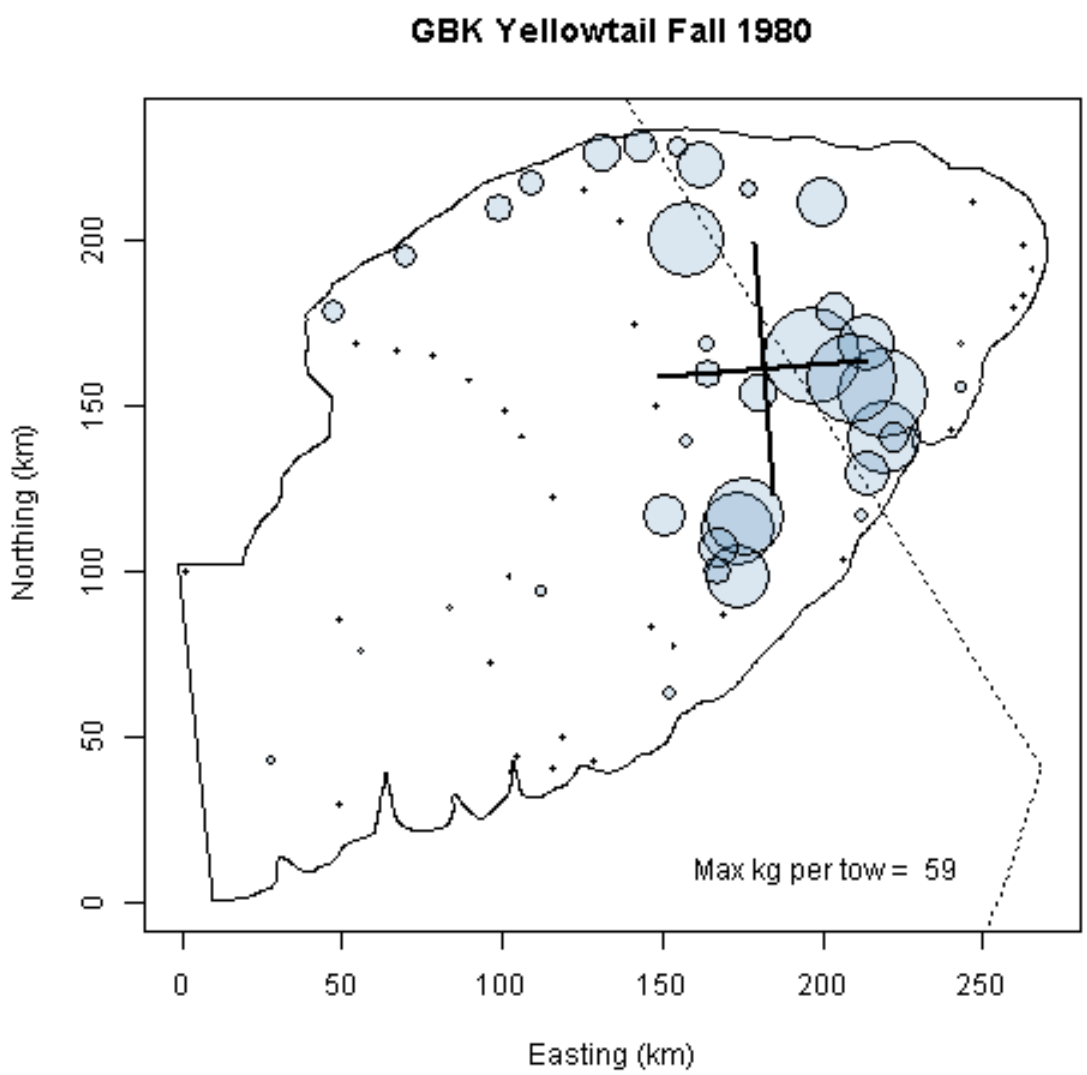

GBK Yellowtail Fall 1975
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 10

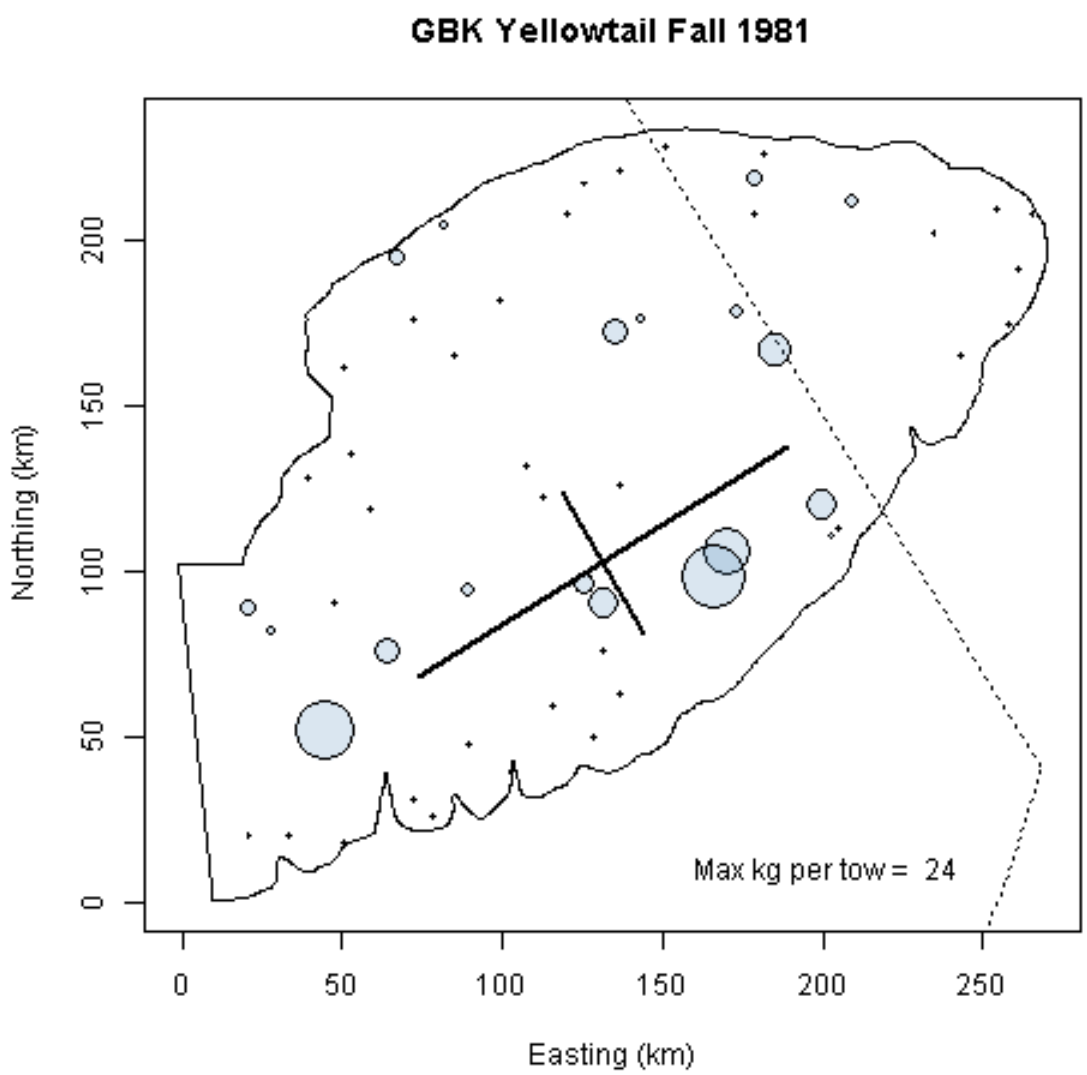

GBK Yellowtail Fall 1976
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 11

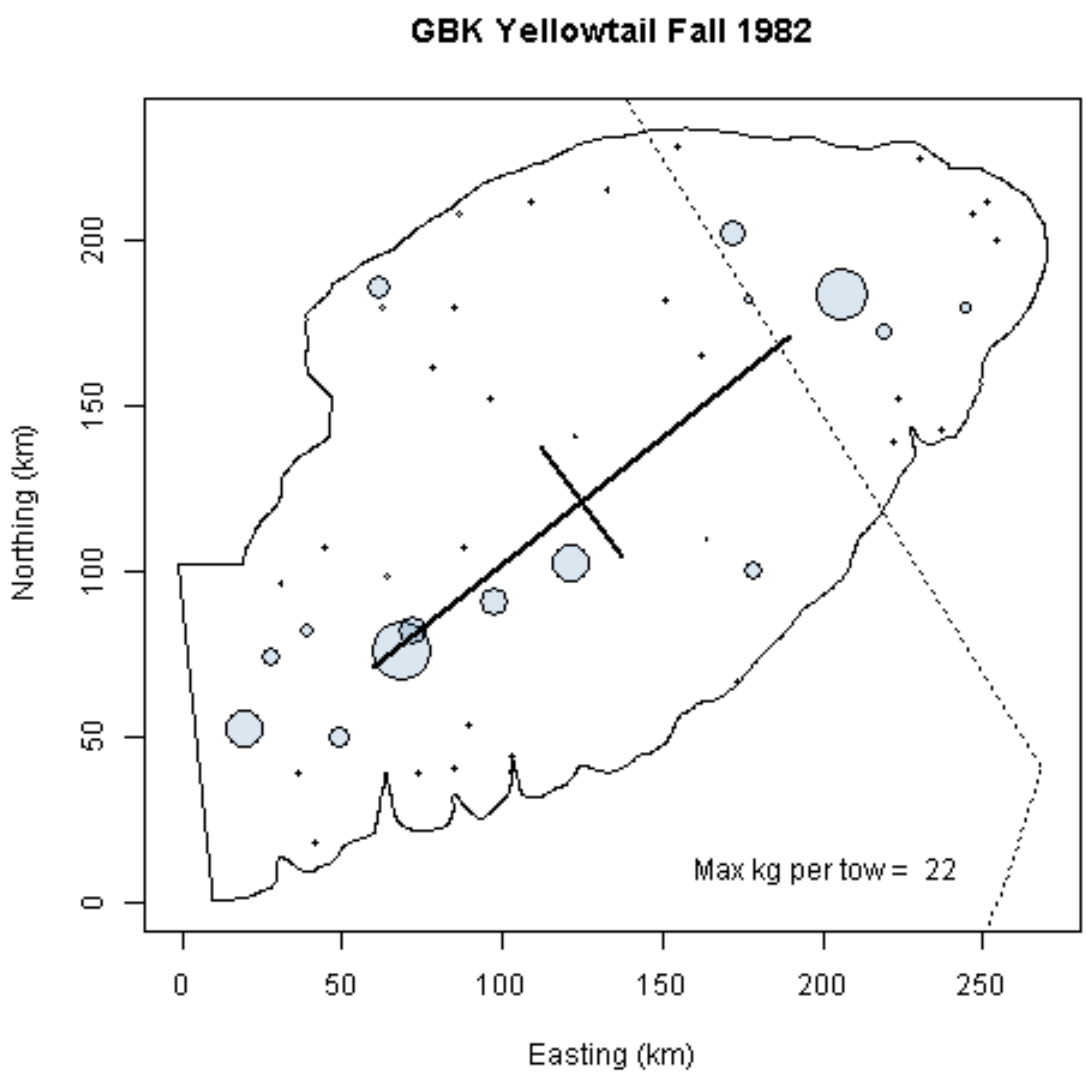

GBK Yellowtail Fall 1977
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 28

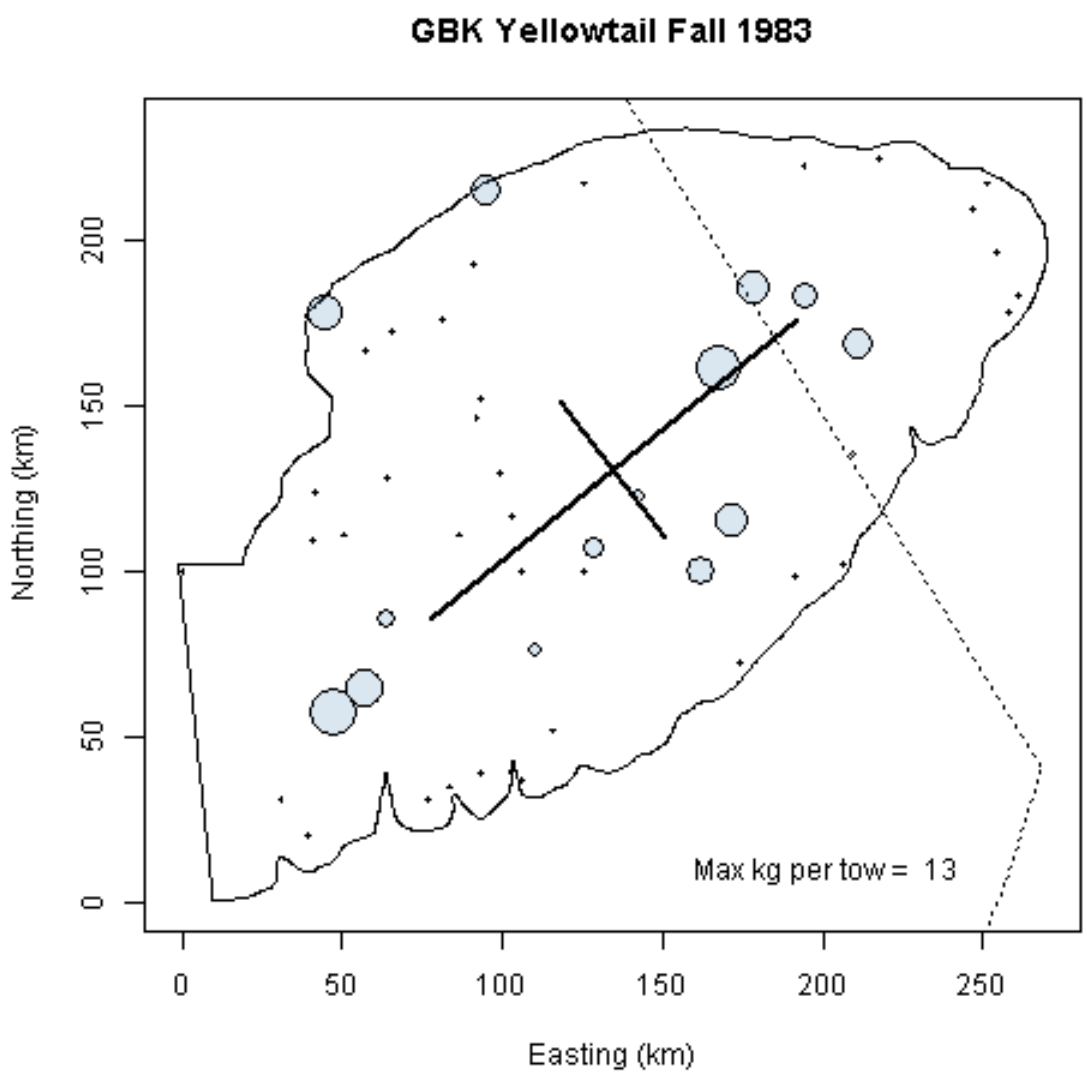

GBK Yellowtail Fall 1978
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 29

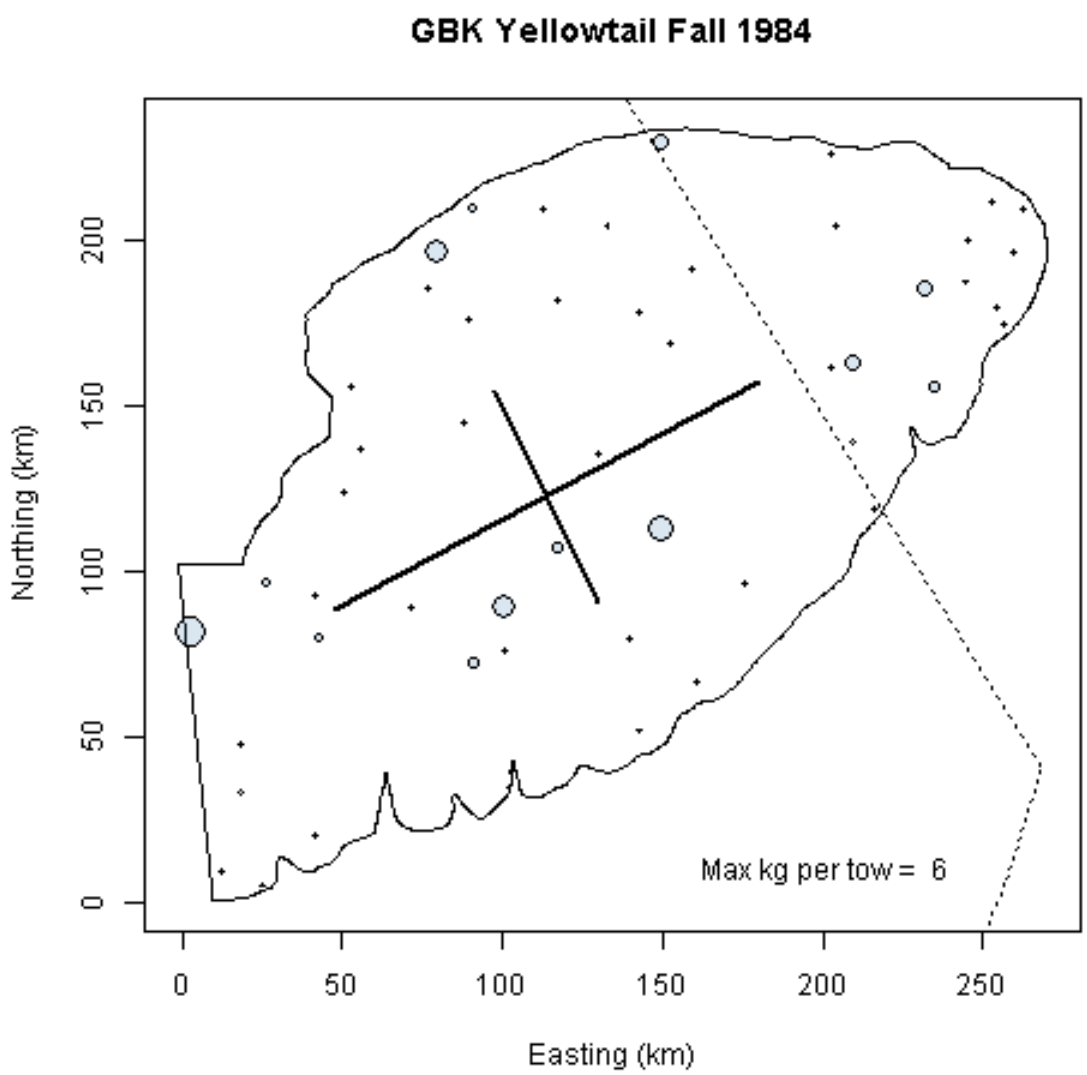

GBK Yellowtail Fall 1979
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 29

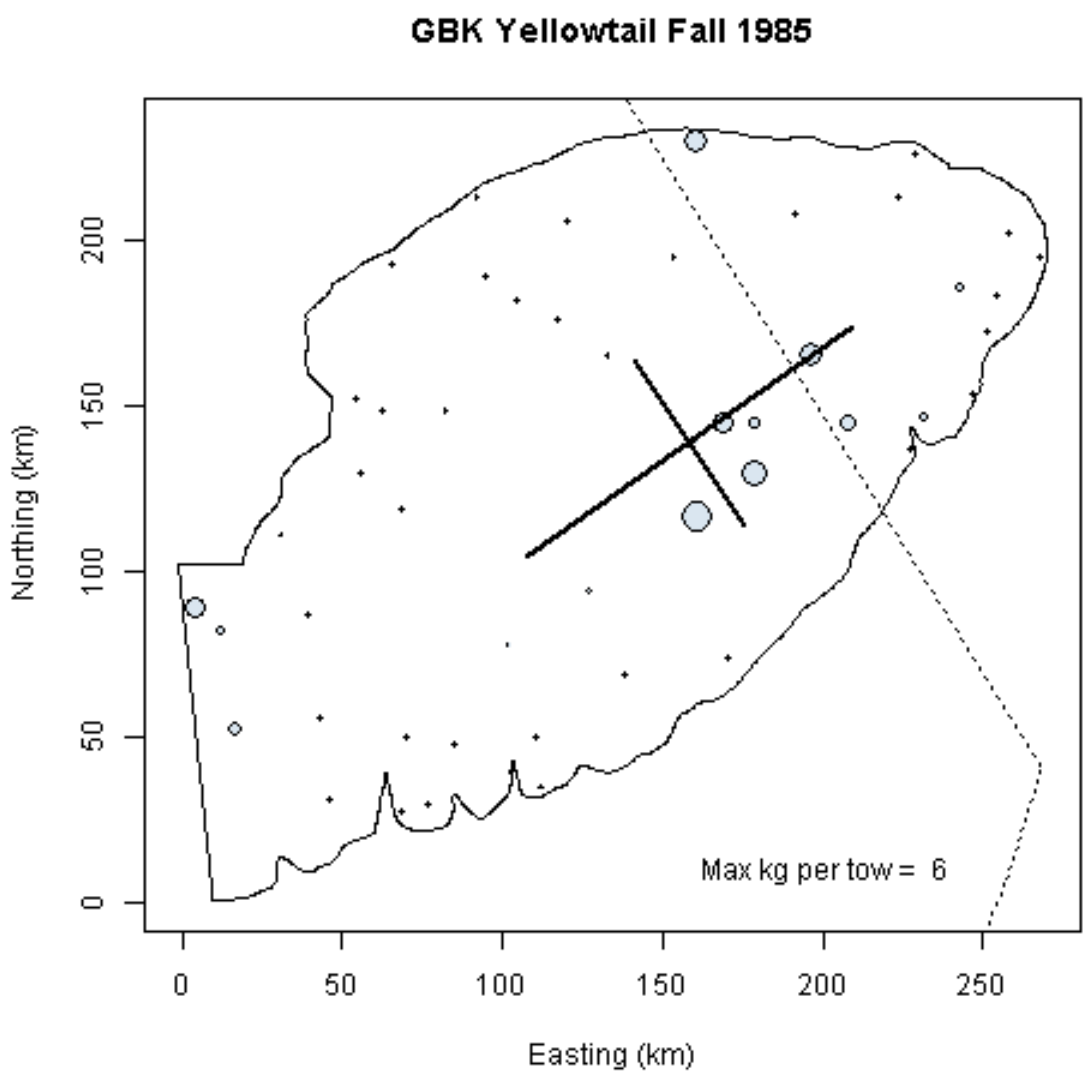

GBK Yellowtail Fall 1980
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 59

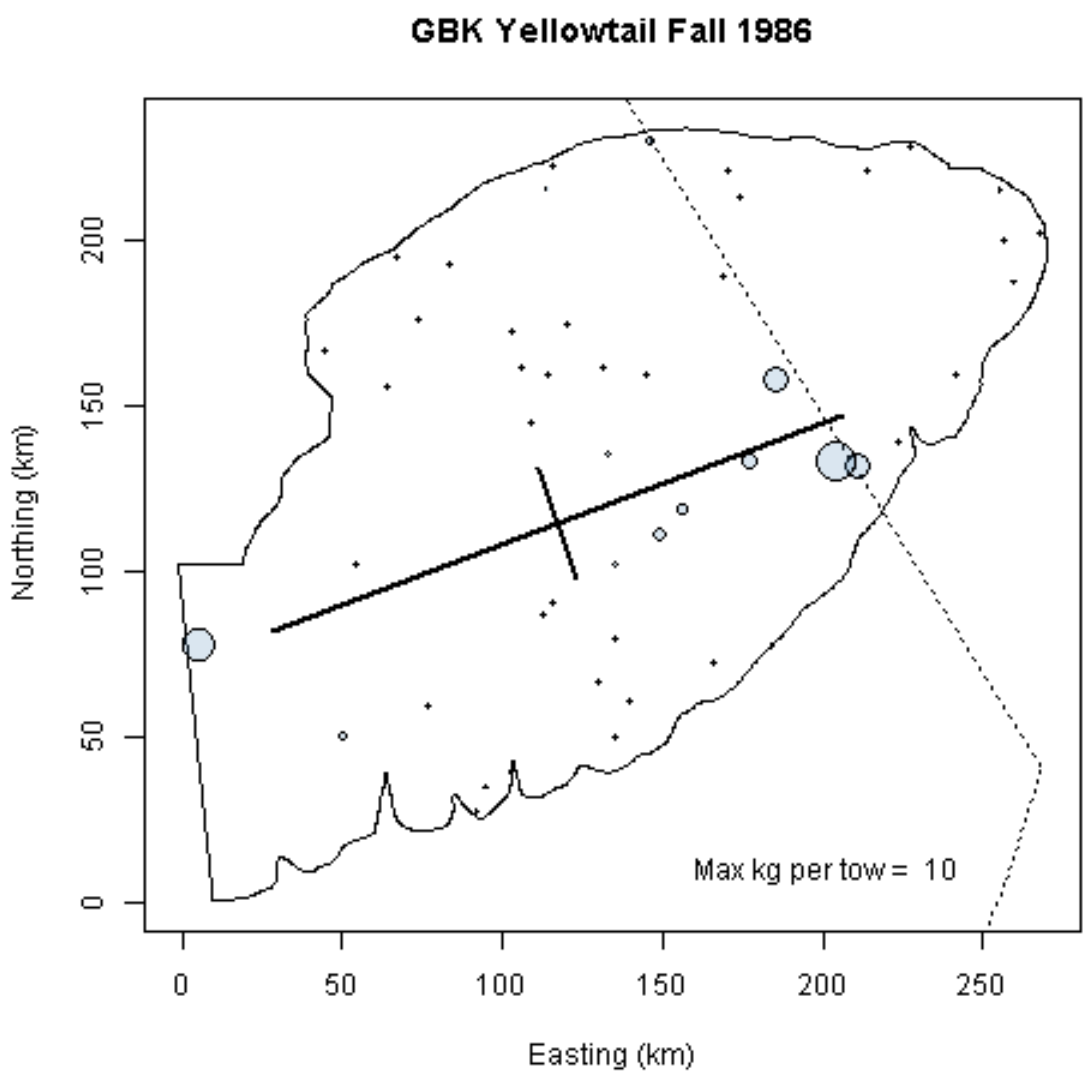

GBK Yellowtail Fall 1981
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 24

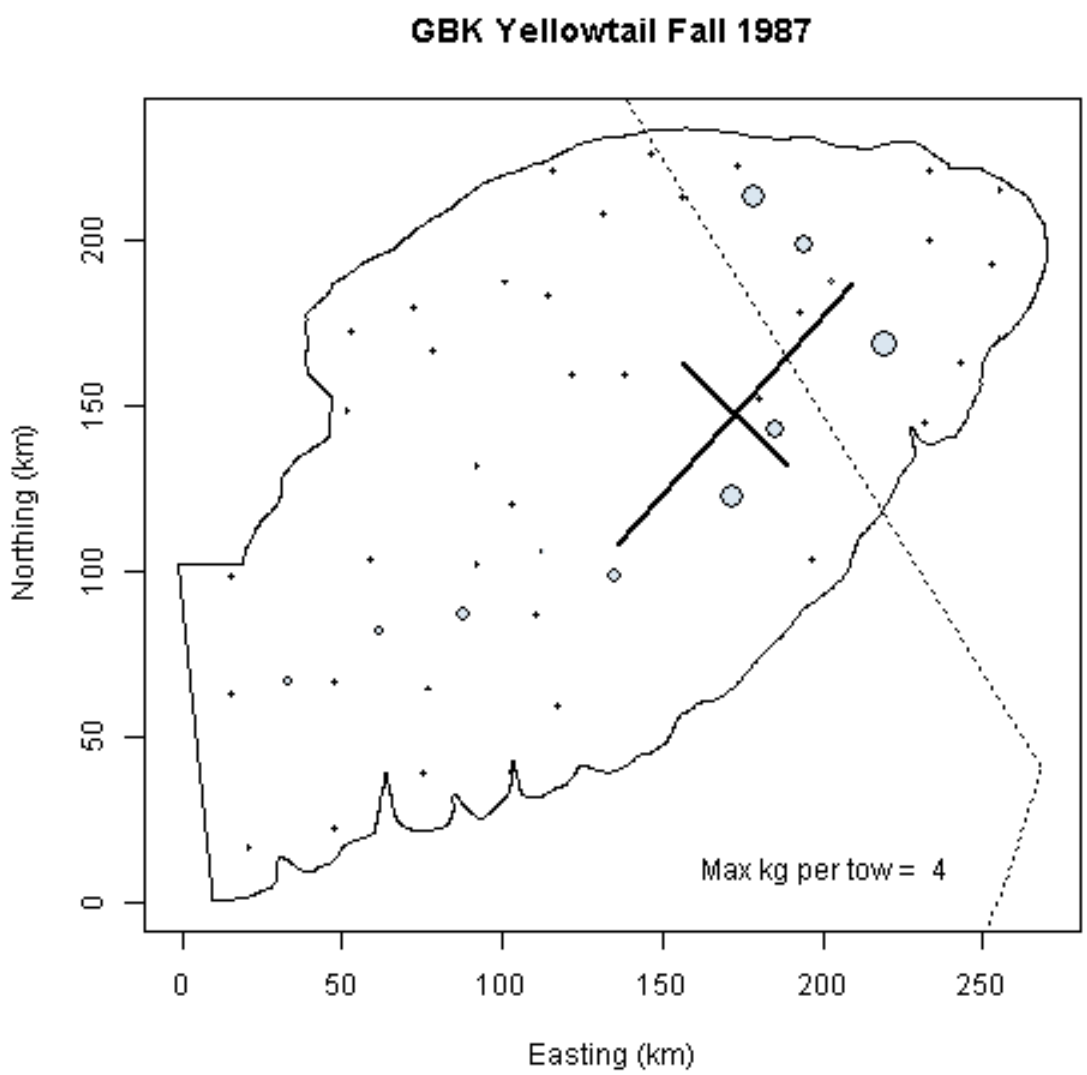

GBK Yellowtail Fall 1982
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 22

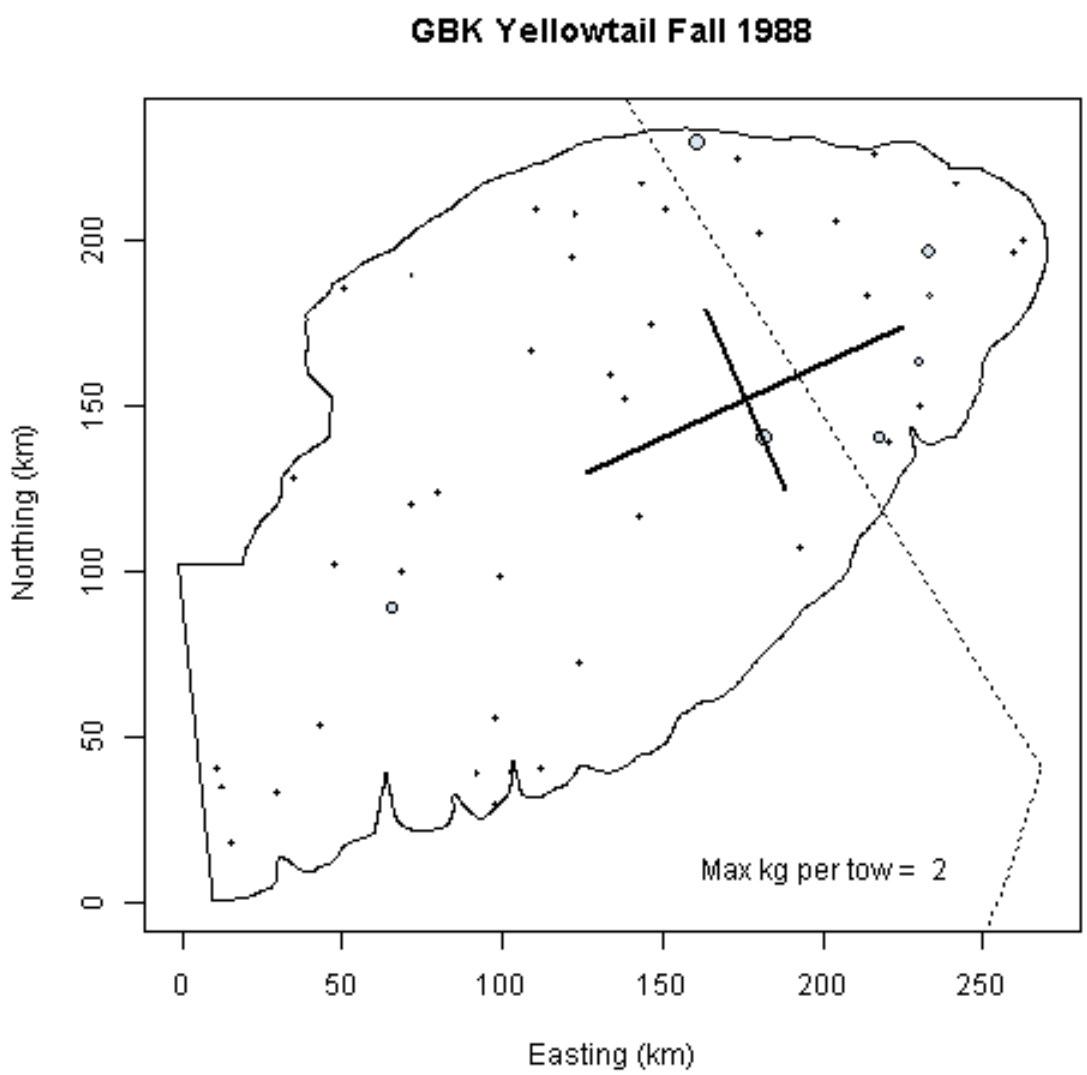

GBK Yellowtail Fall 1983
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 13

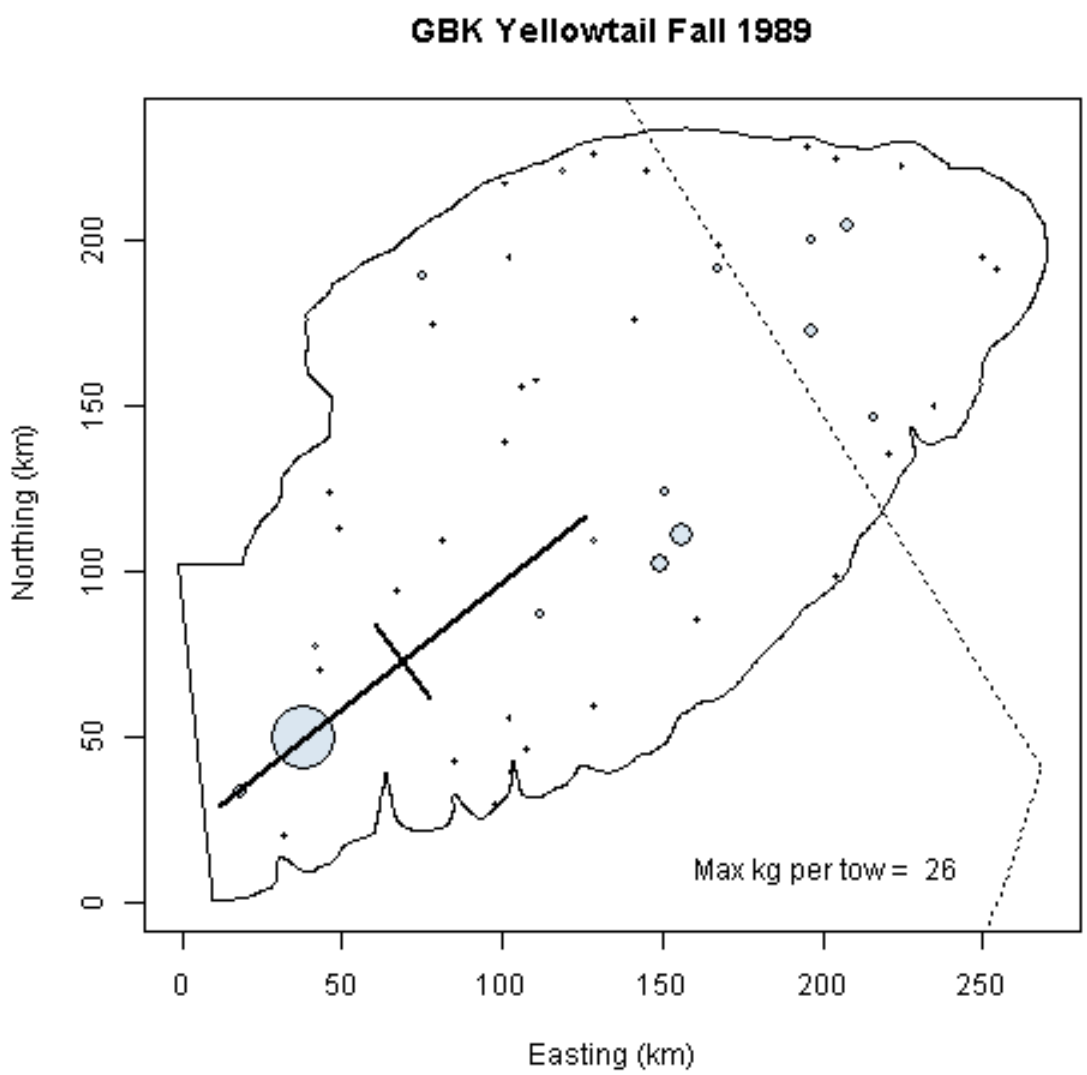

GBK Yellowtail Fall 1984
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 6

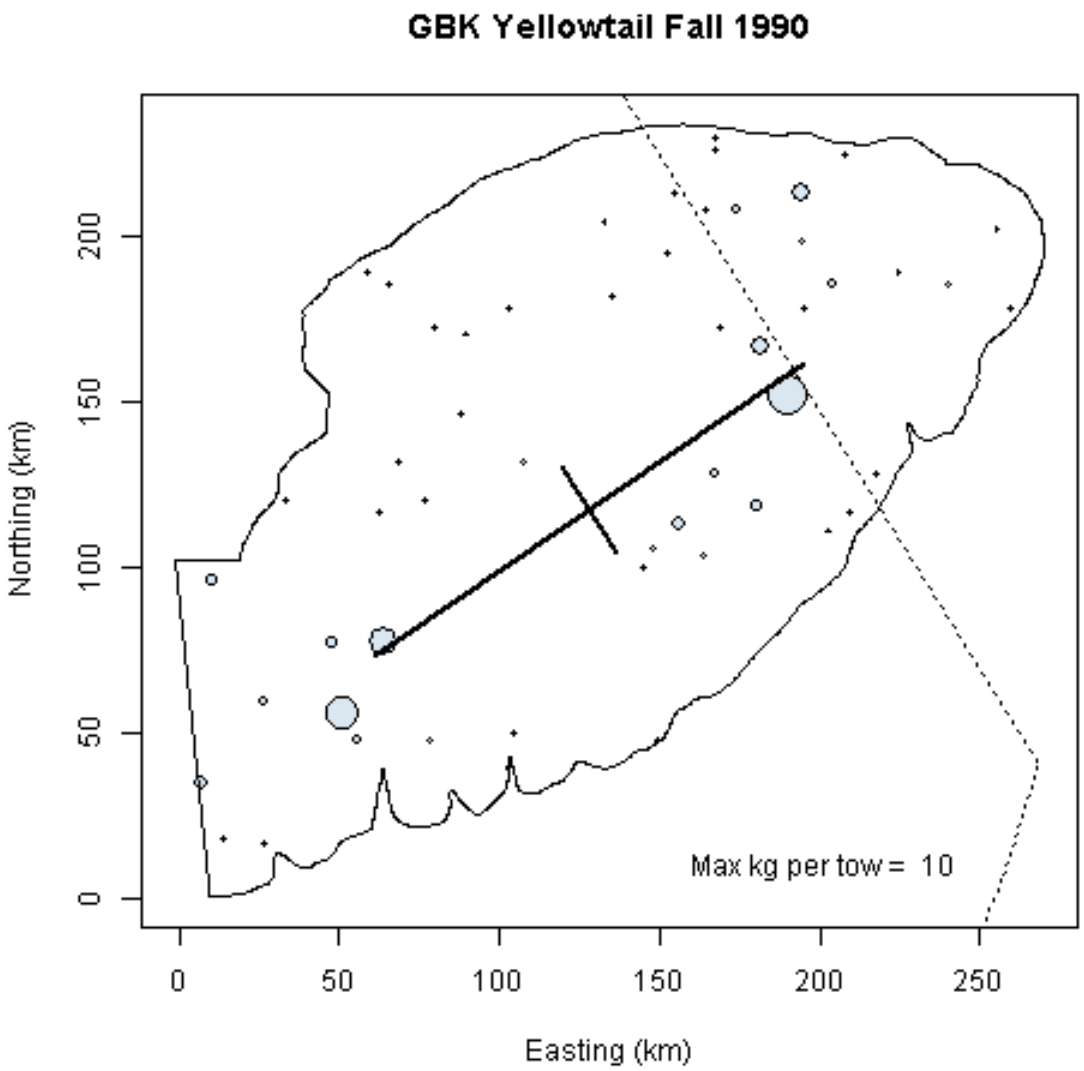

GBK Yellowtail Fall 1985
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 6

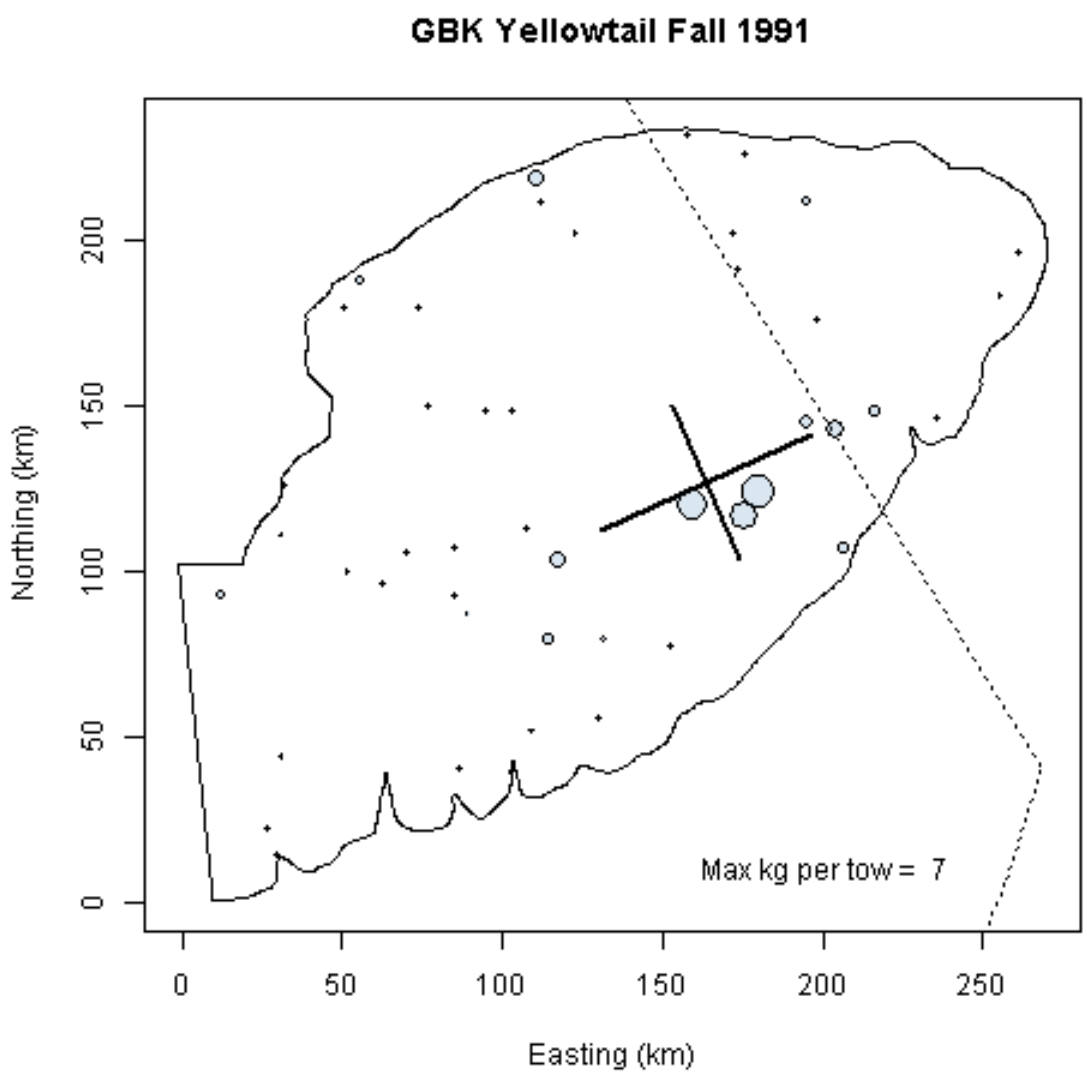

GBK Yellowtail Fall 1986
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 10

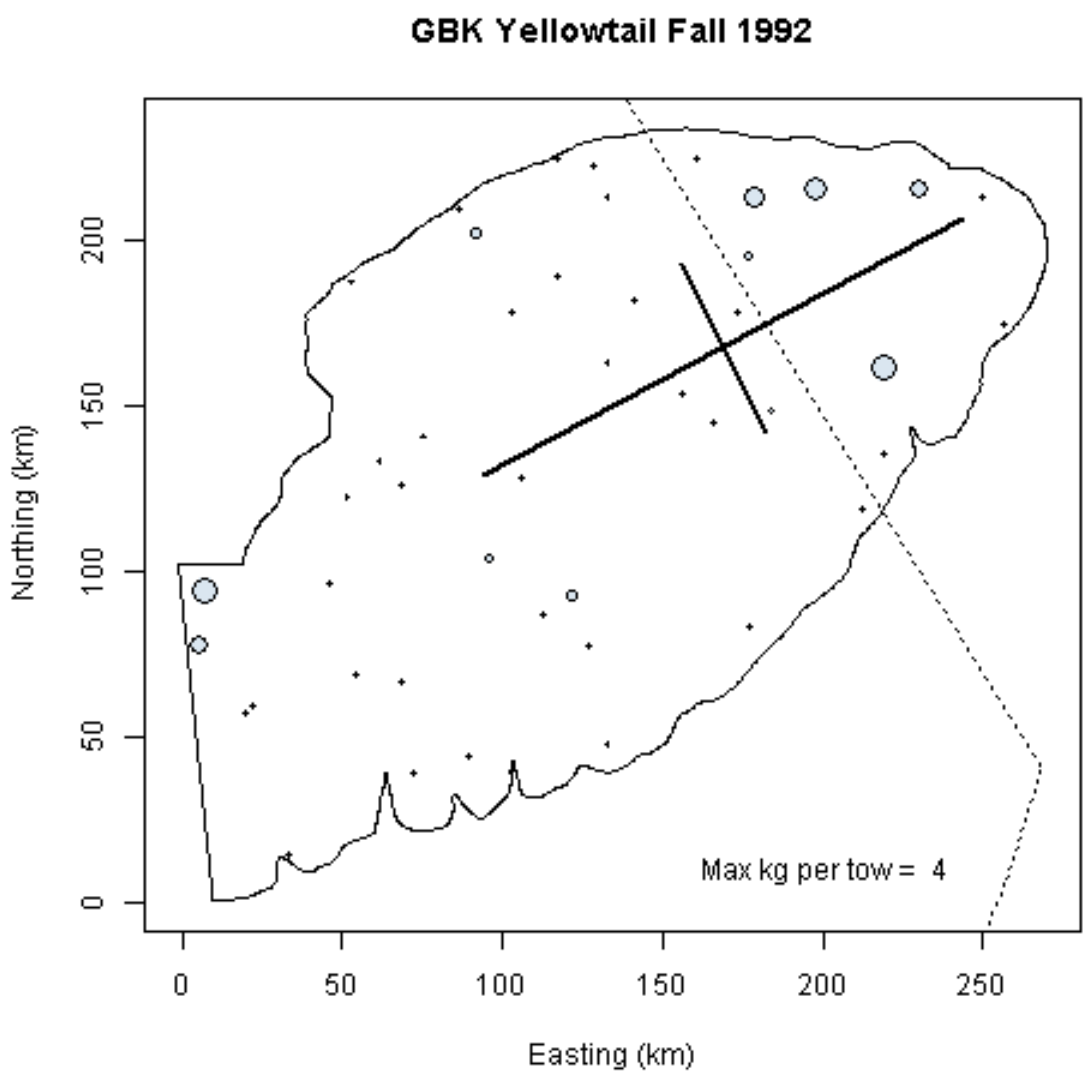

GBK Yellowtail Fall 1987
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 4

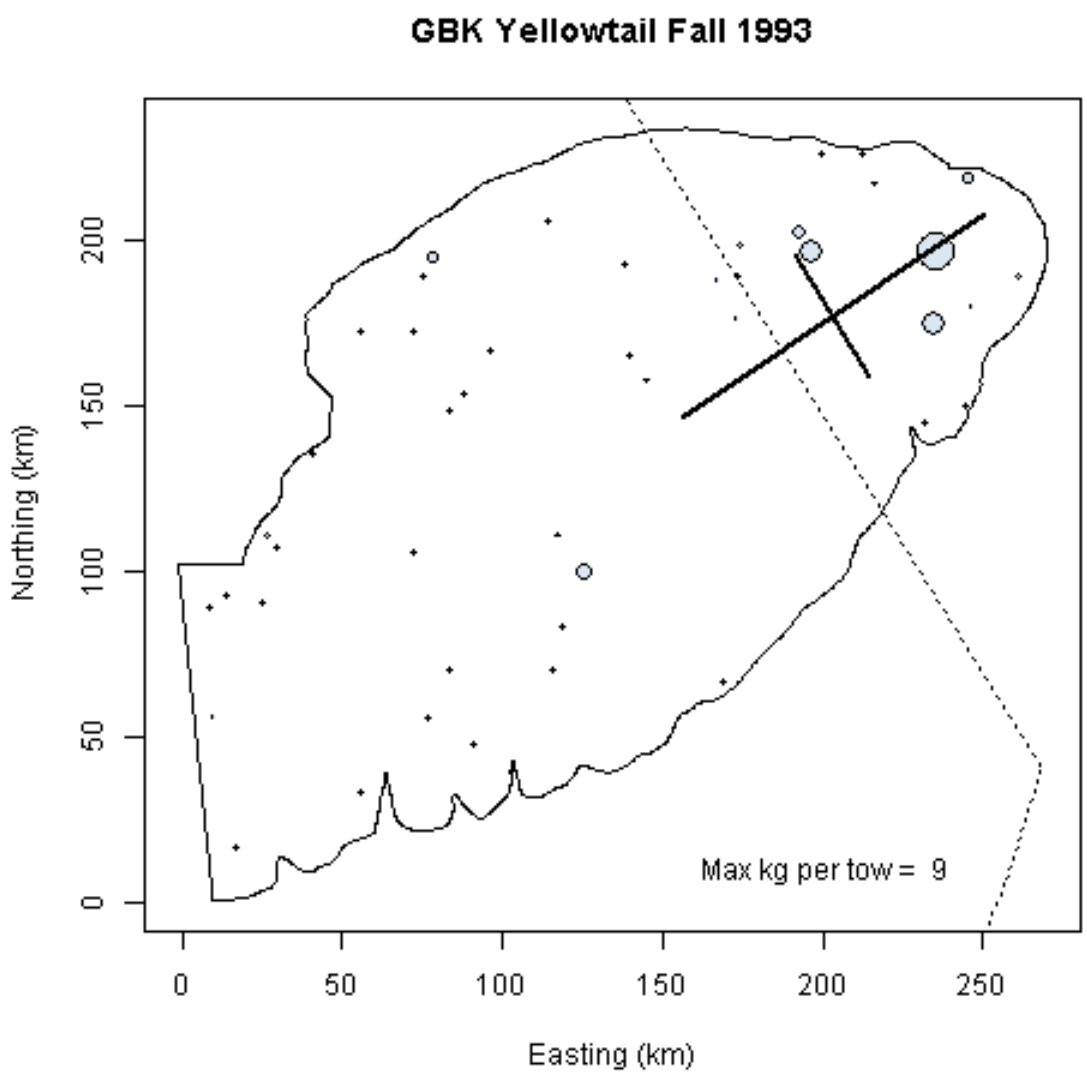

GBK Yellowtail Fall 1988
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 2

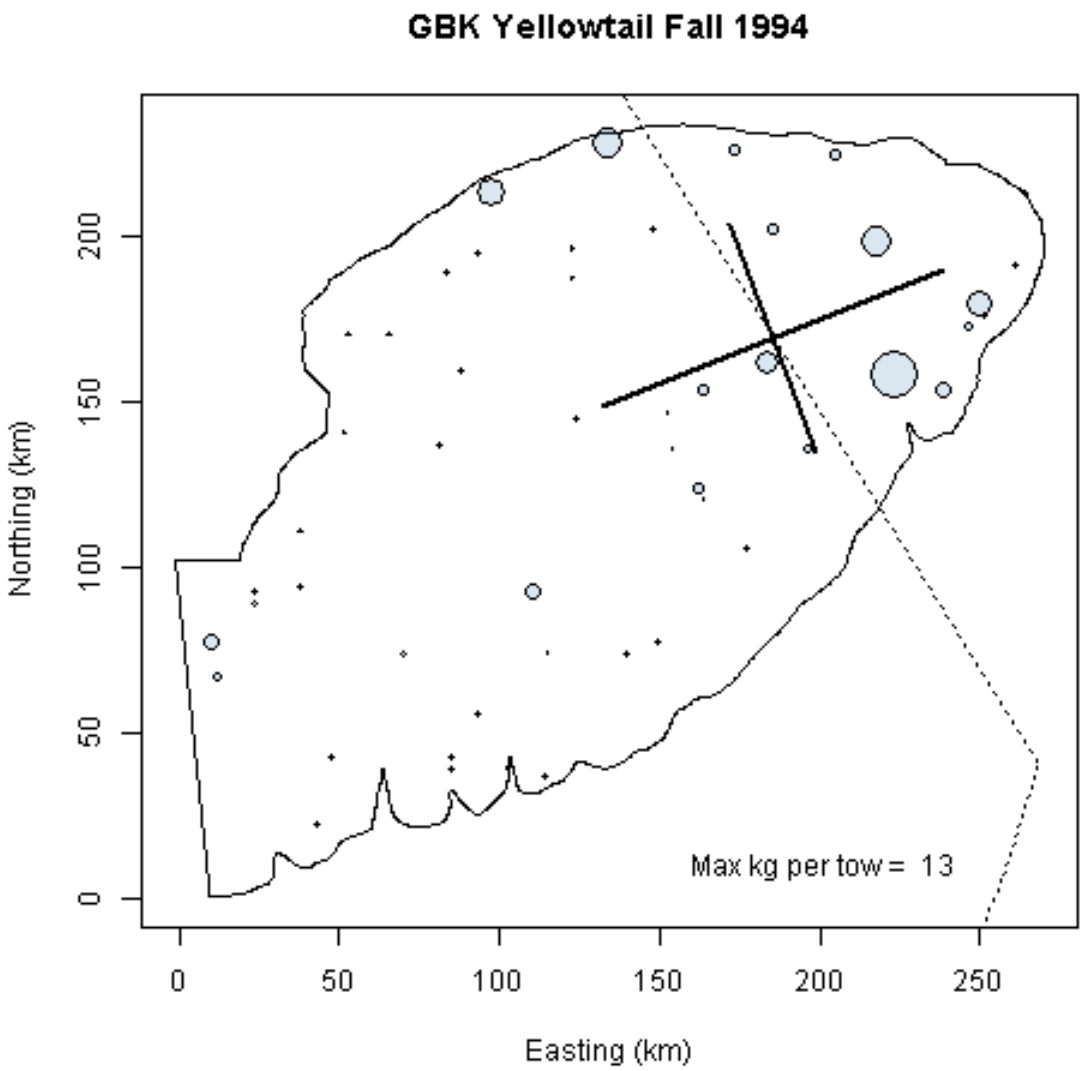

GBK Yellowtail Fall 1989
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 26

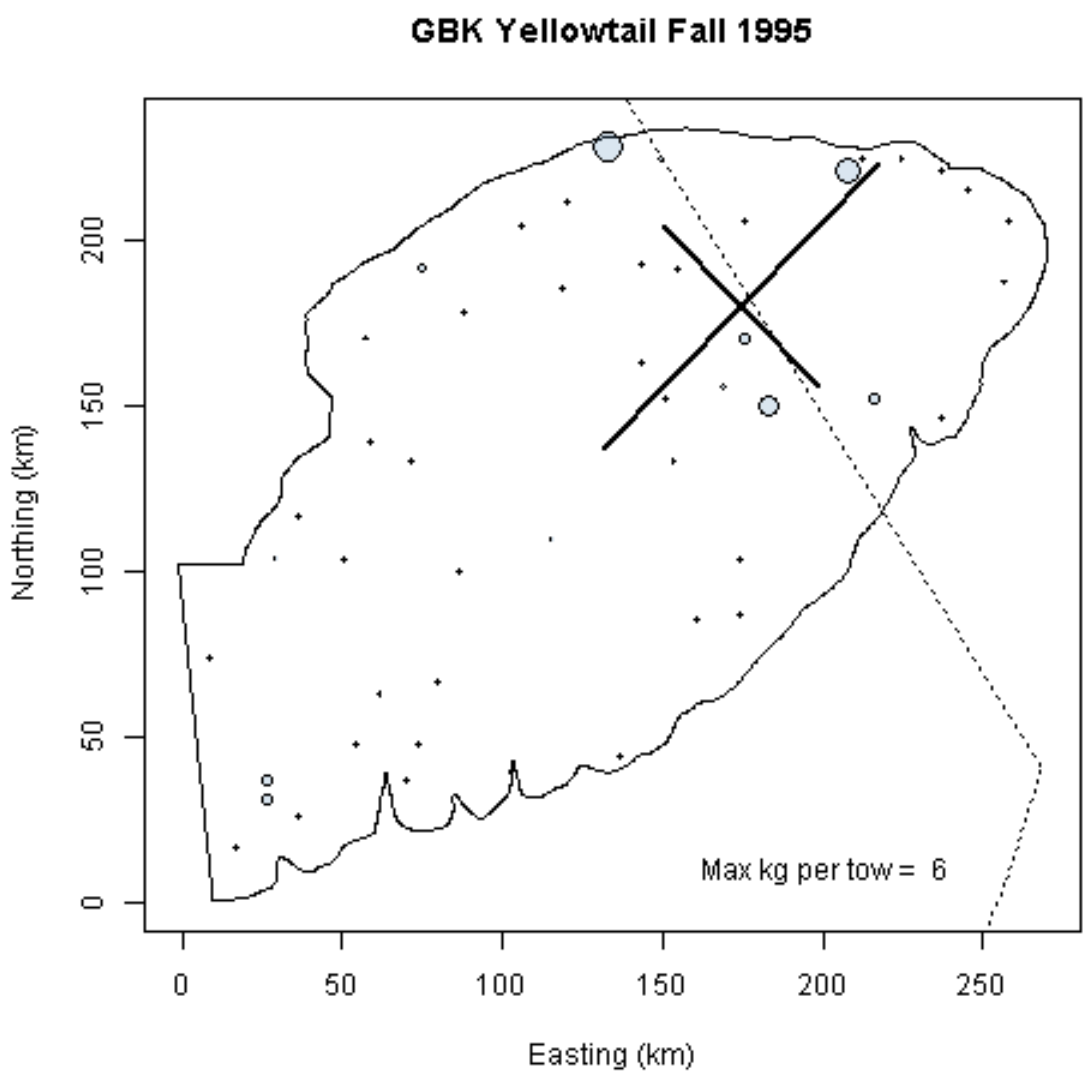

GBK Yellowtail Fall 1990
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 10

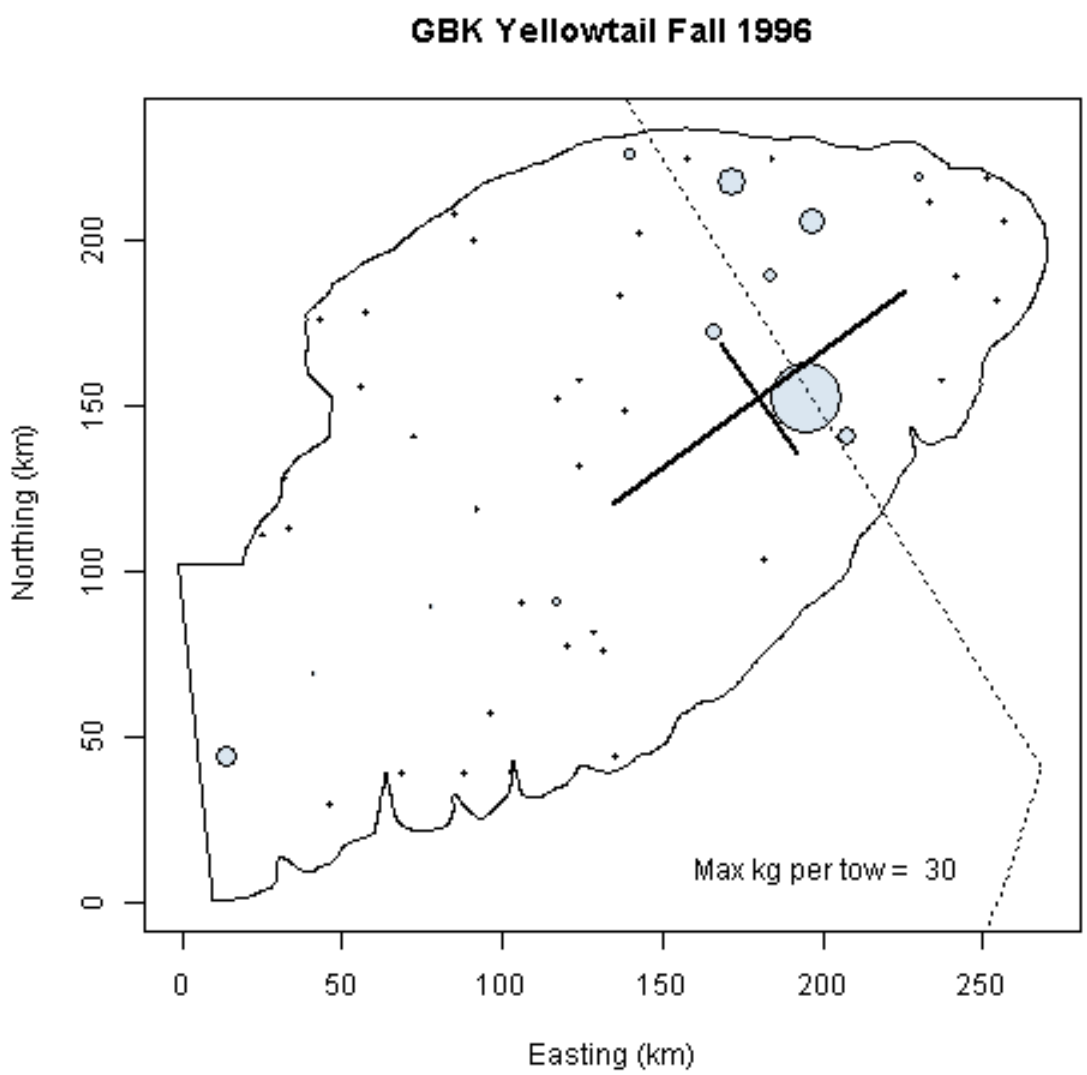

GBK Yellowtail Fall 1991
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 7

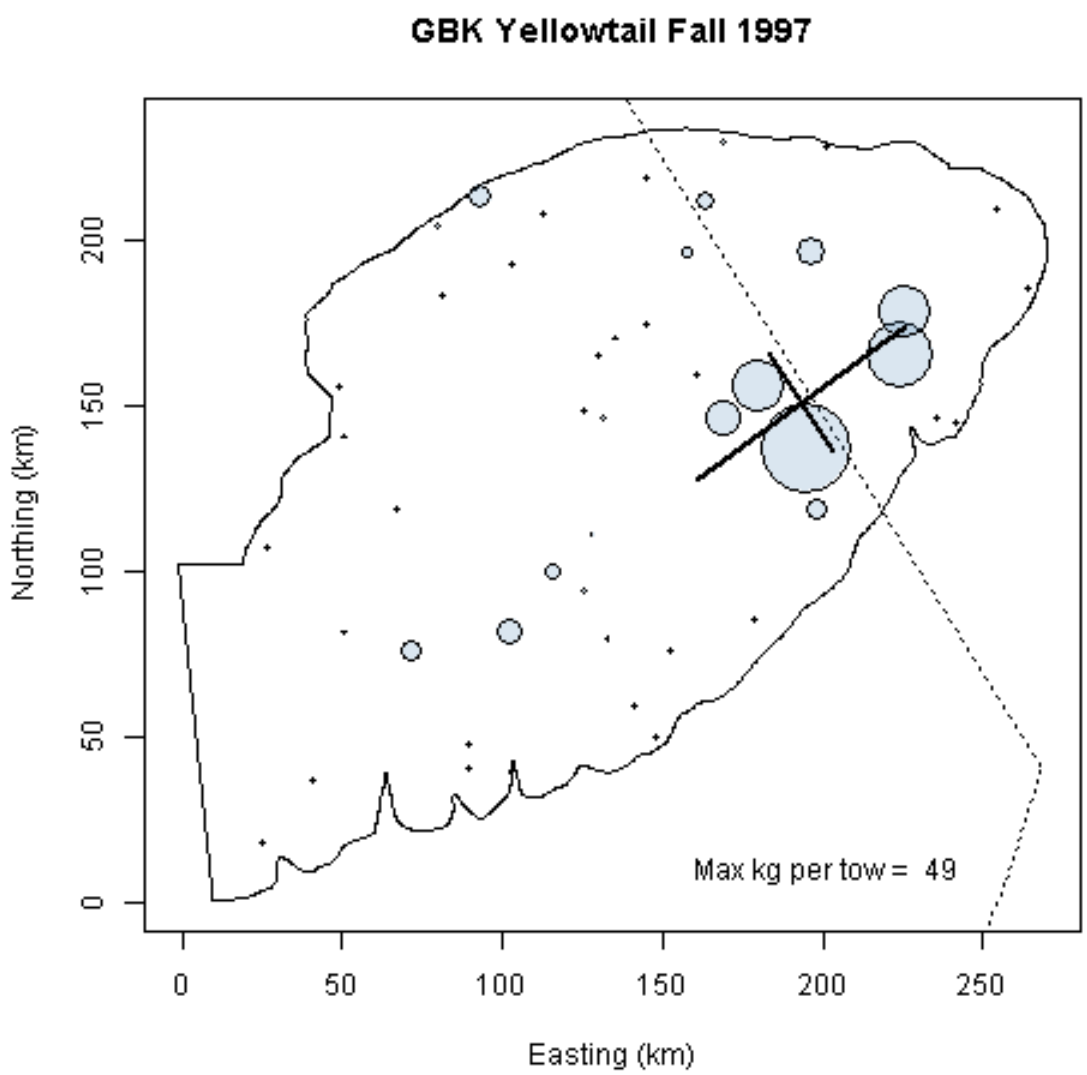

GBK Yellowtail Fall 1992
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 4

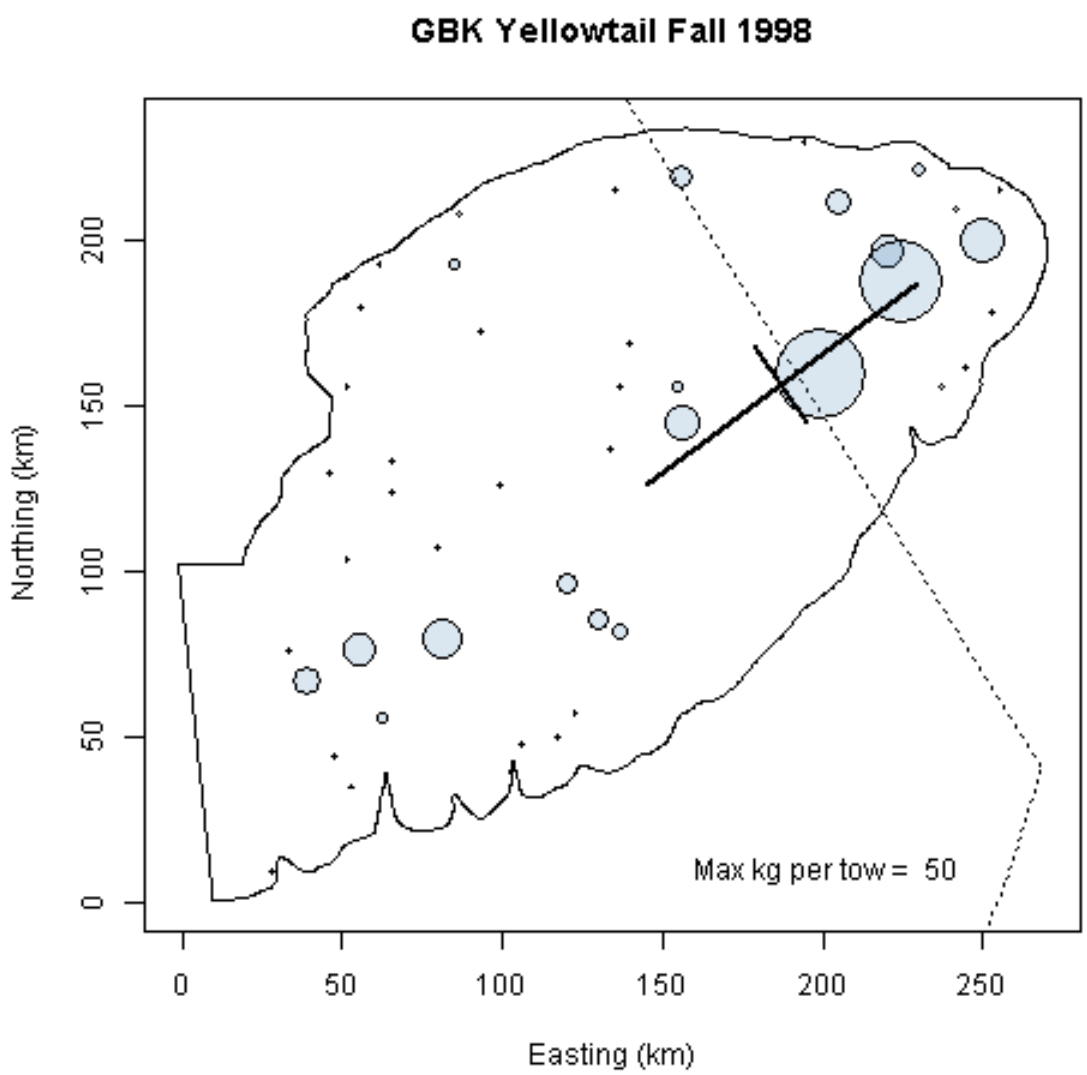

GBK Yellowtail Fall 1993
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 9

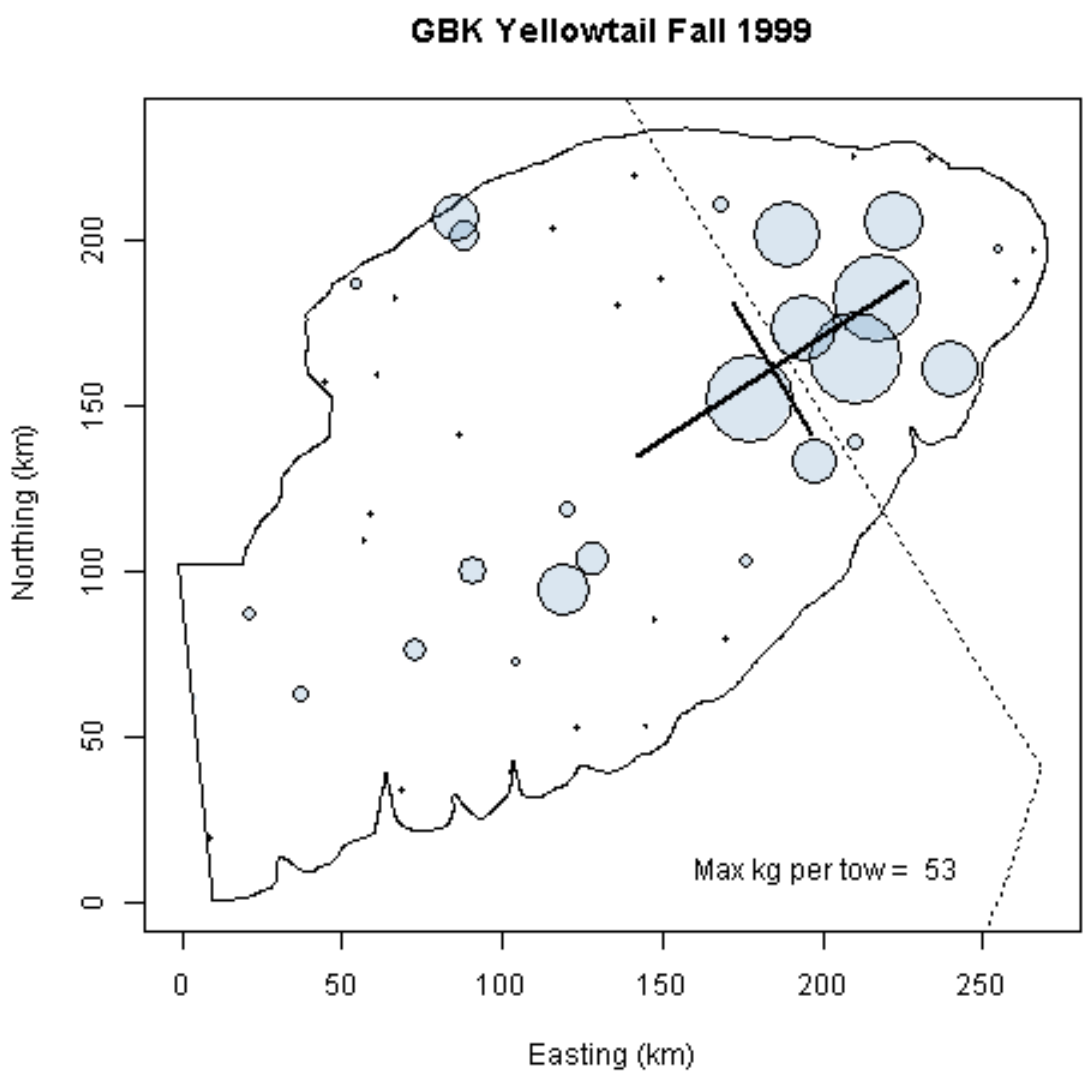

GBK Yellowtail Fall 1994
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 13

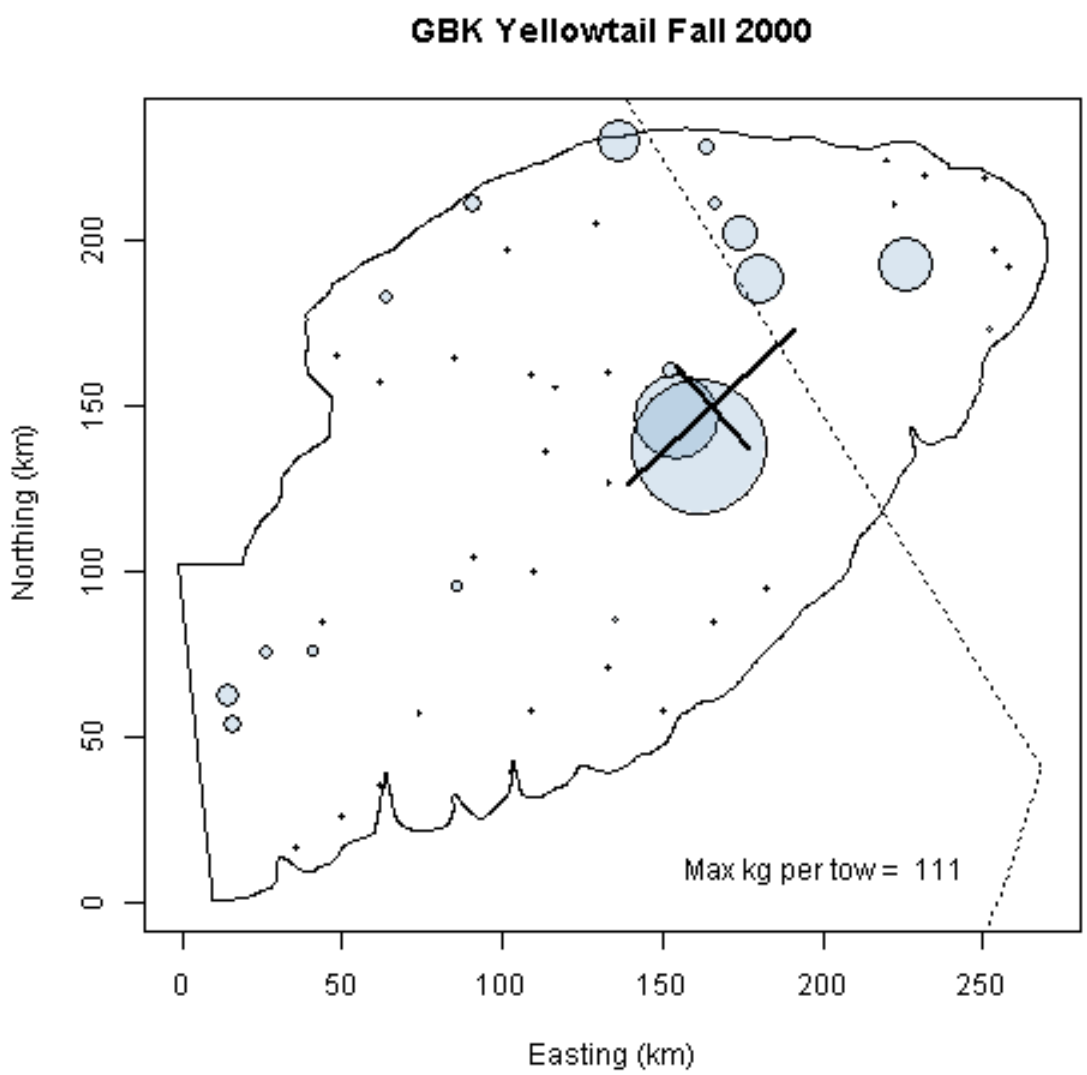

GBK Yellowtail Fall 1995
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 6

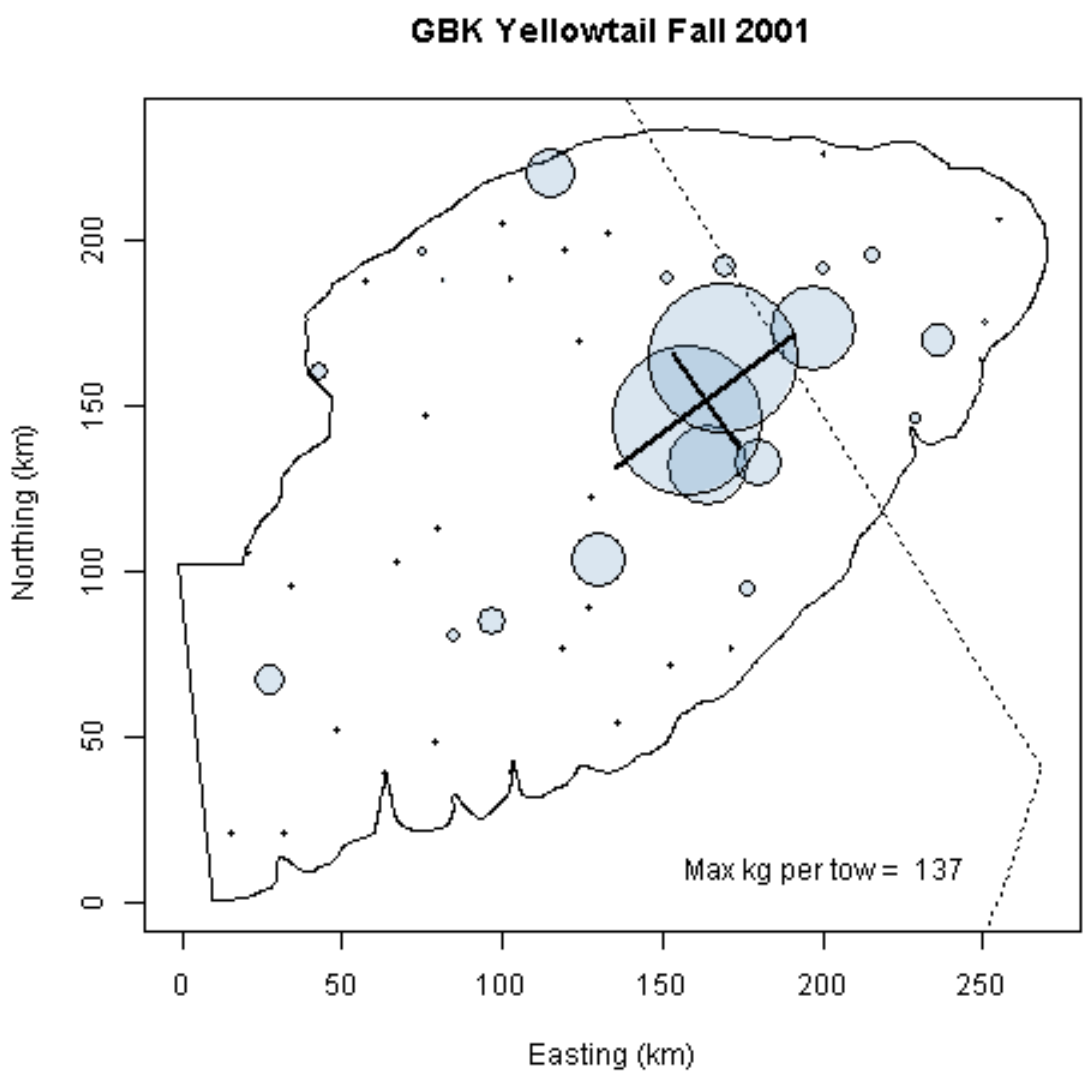

GBK Yellowtail Fall 1996
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 30

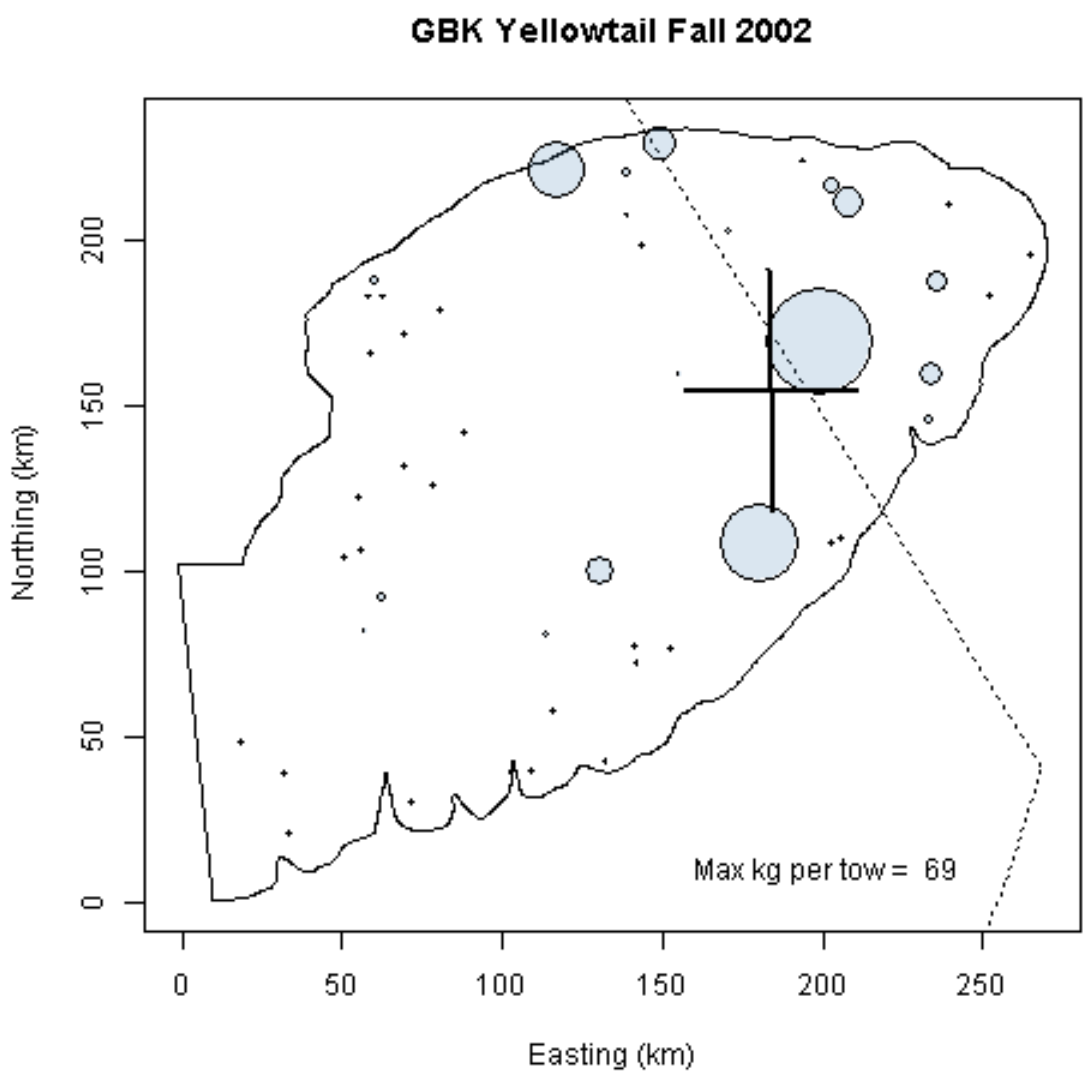

GBK Yellowtail Fall 1997
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 49

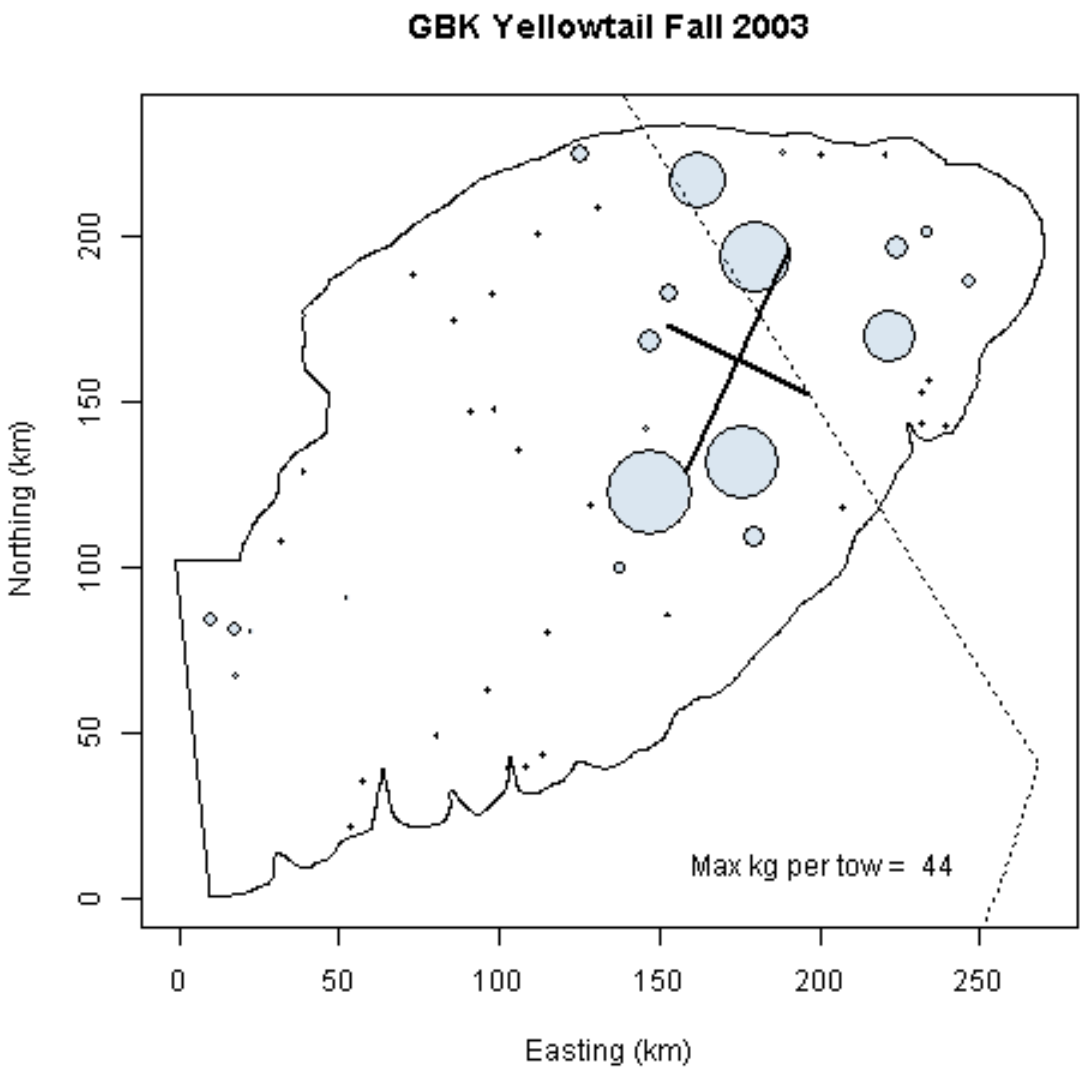

GBK Yellowtail Fall 1998
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 50

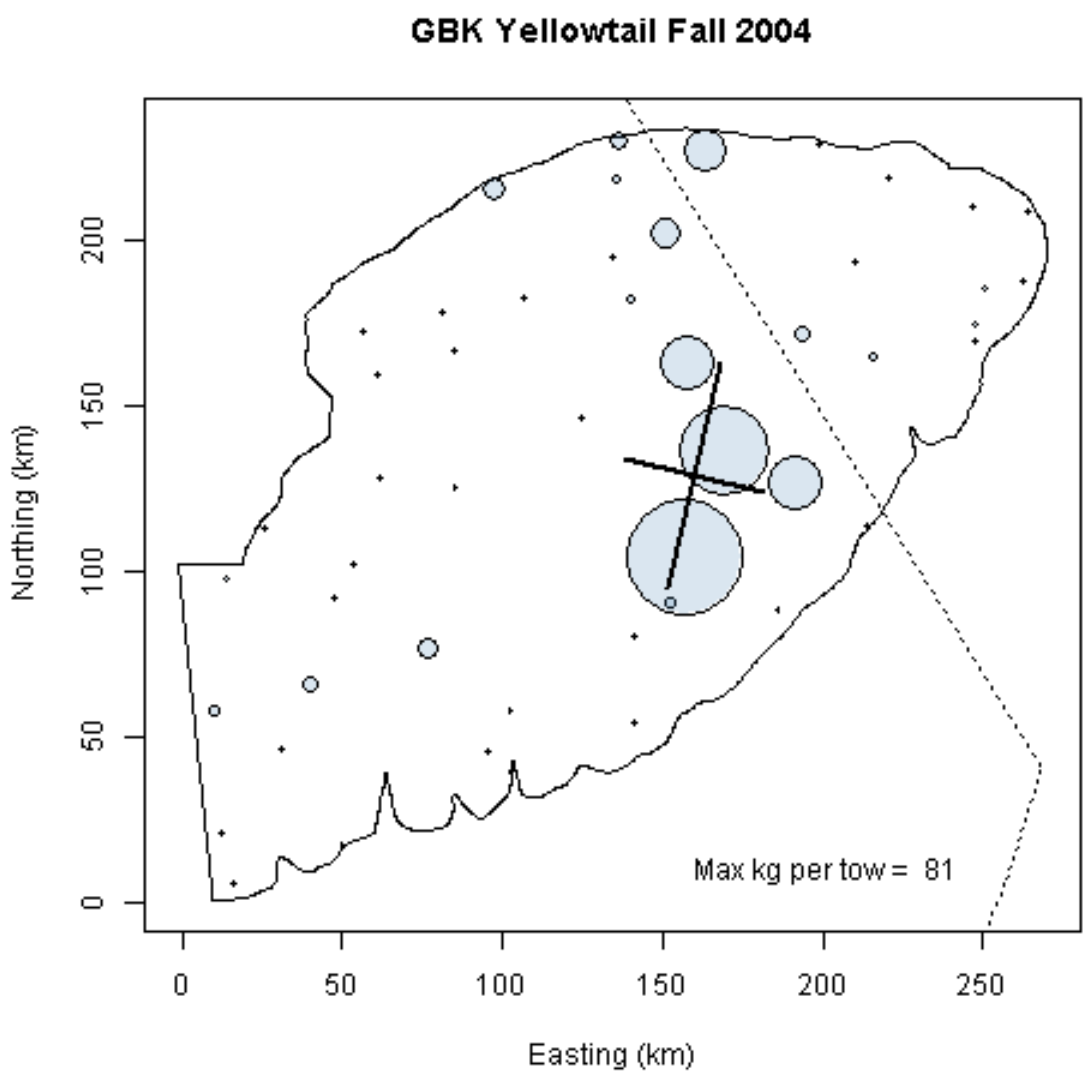

GBK Yellowtail Fall 1999
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 53

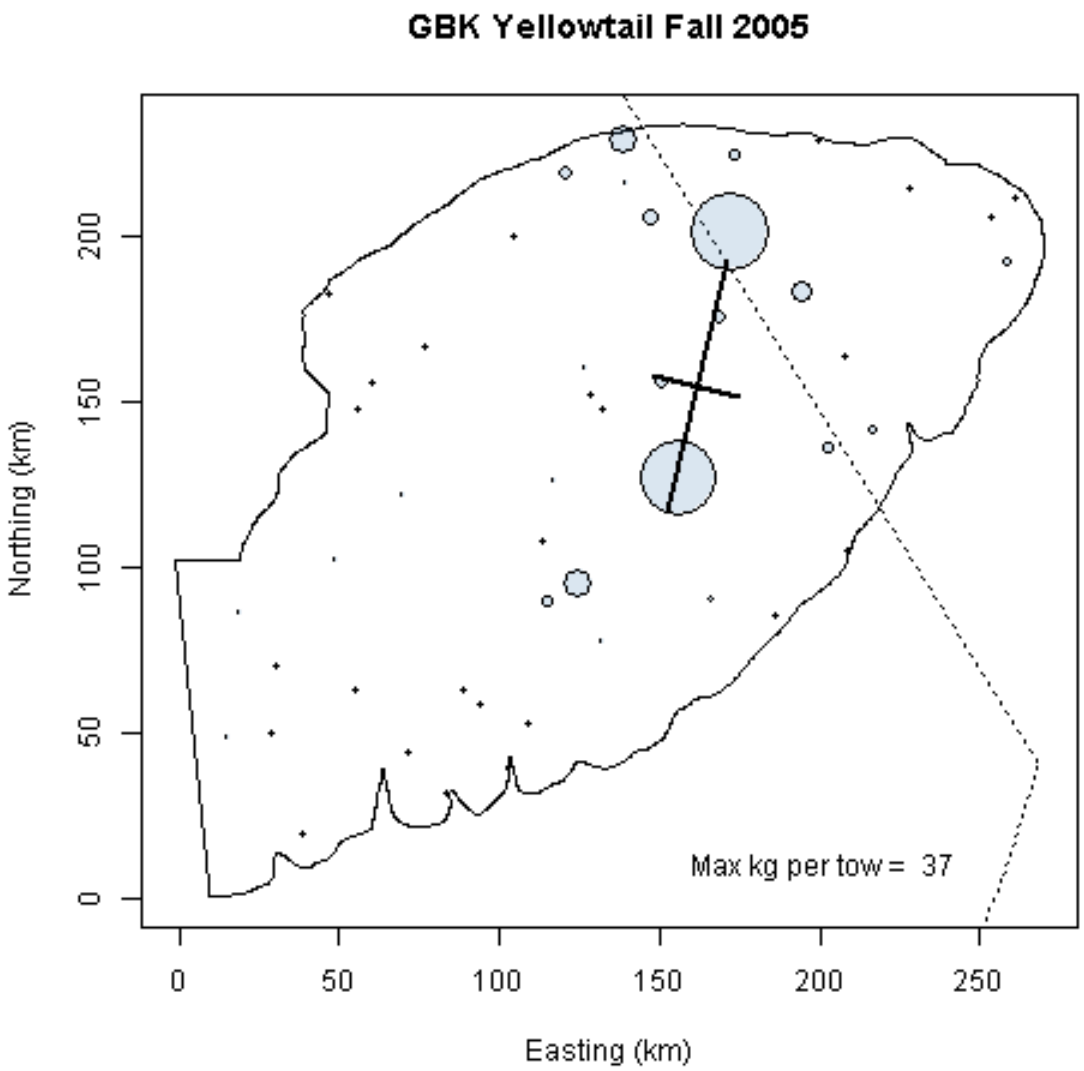

GBK Yellowtail Fall 2000
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 111

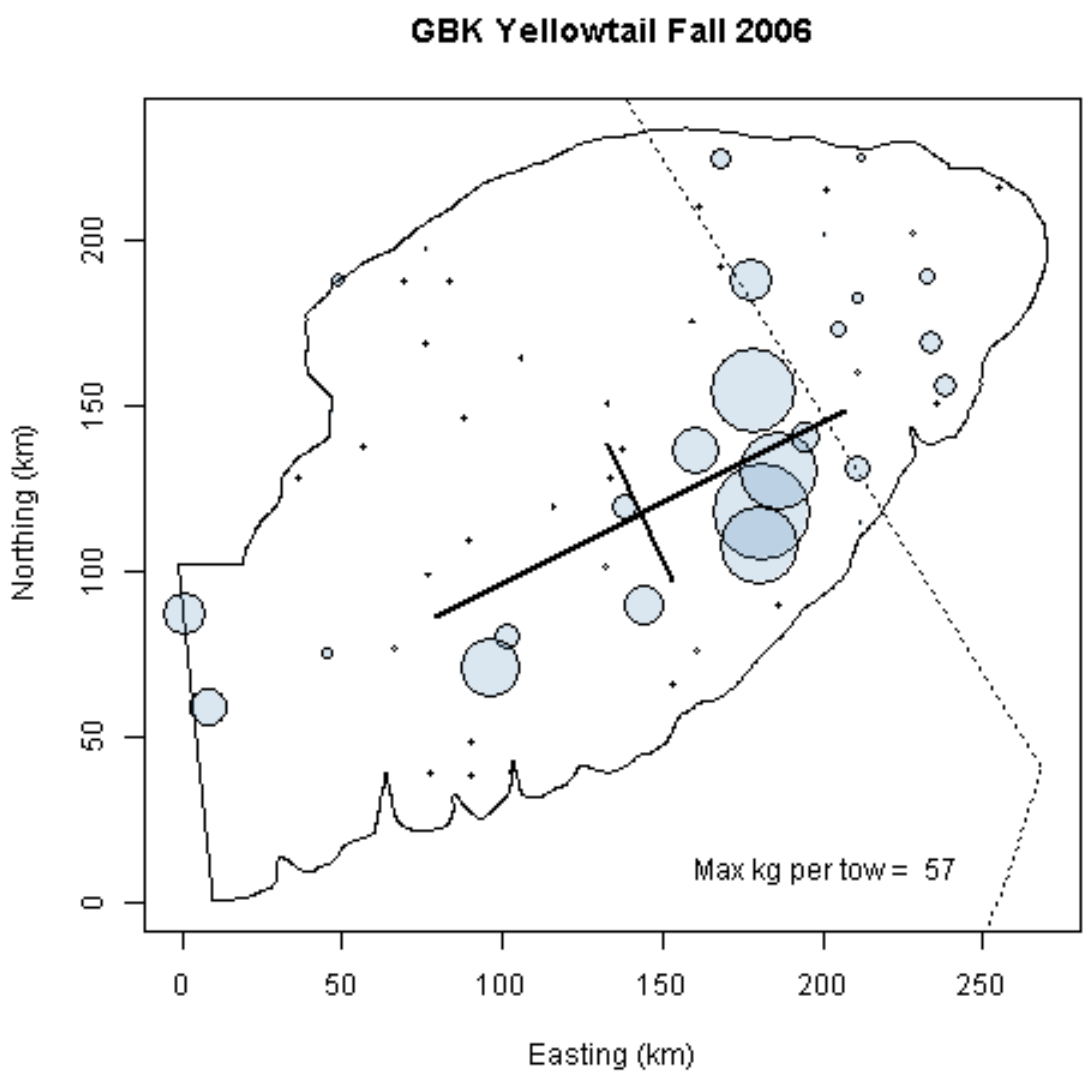

GBK Yellowtail Fall 2001
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 137

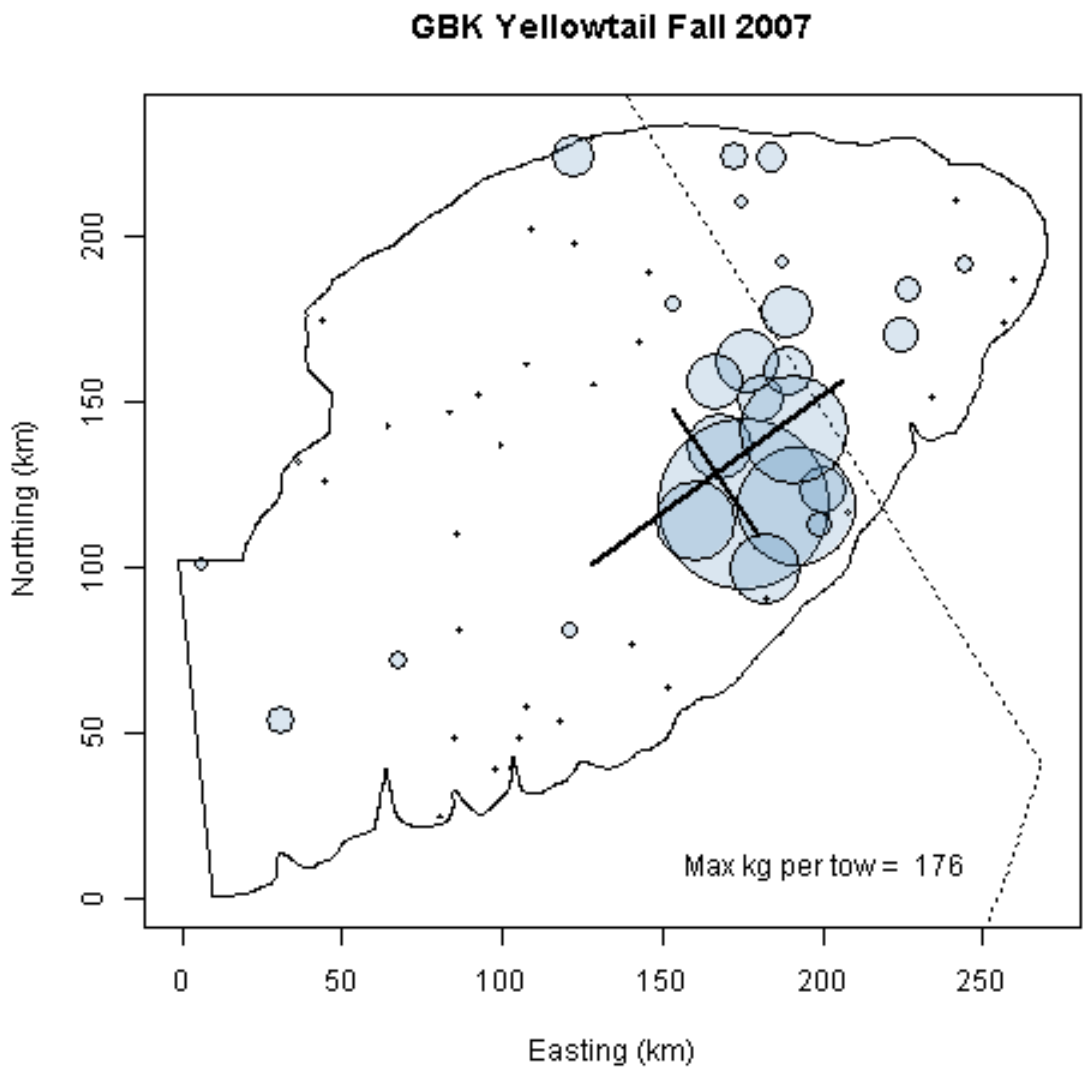

GBK Yellowtail Fall 2002
Northing (km)
0
50
100
150
200
Easting (km)
0
50
100
150
200
250
Max kg per tow = 69

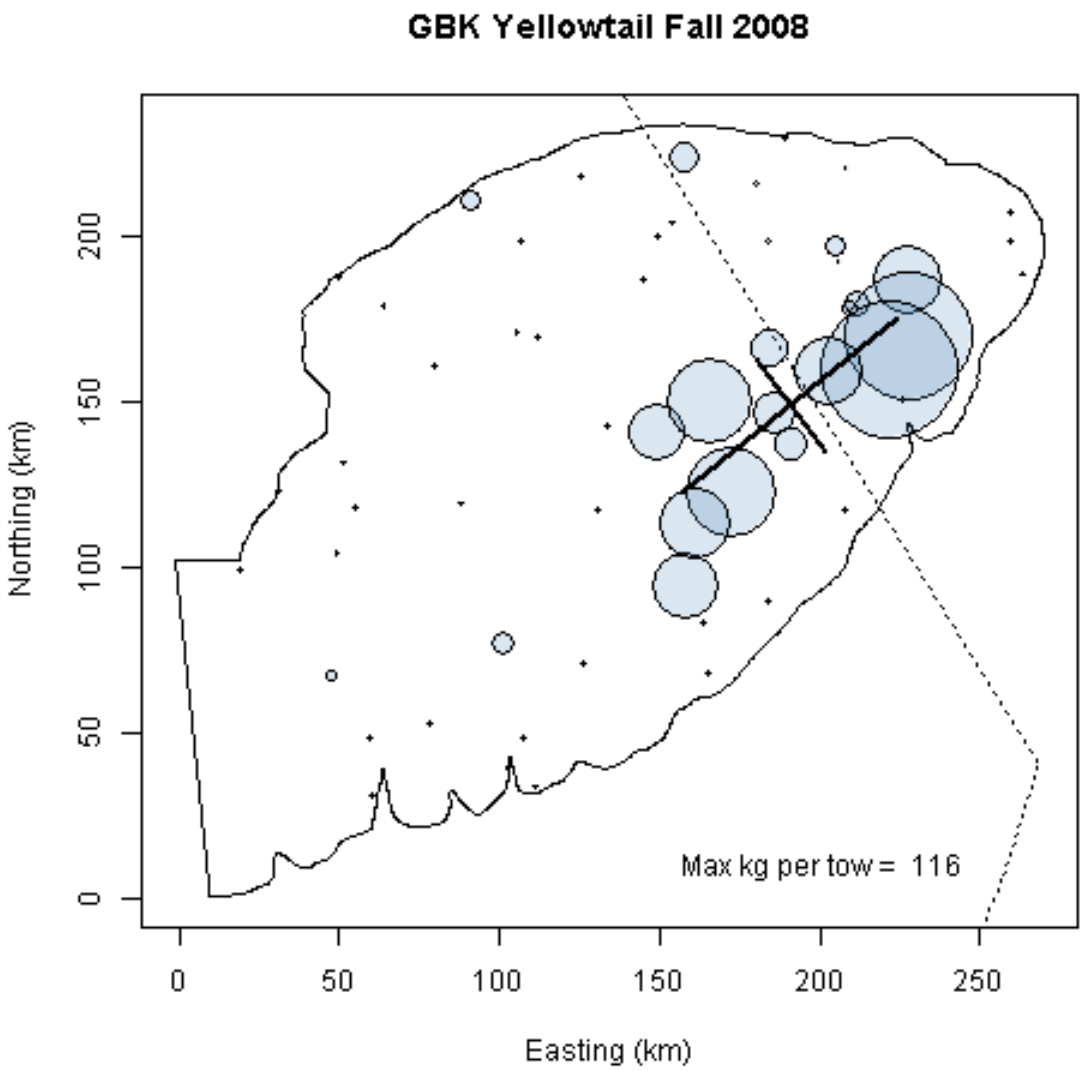

GBK Yellowtail Fall 2003
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 44

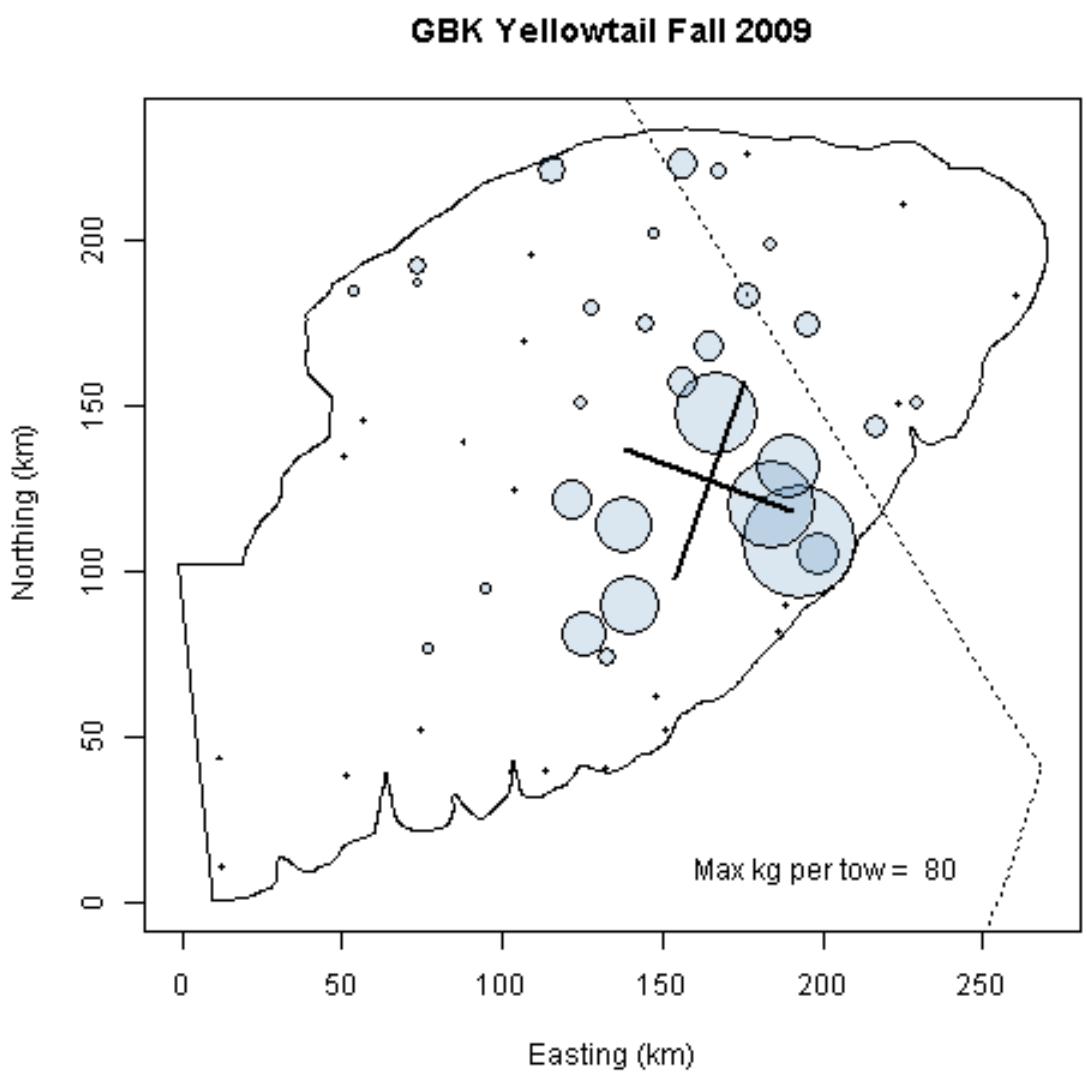

GBK Yellowtail Fall 2004
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 81

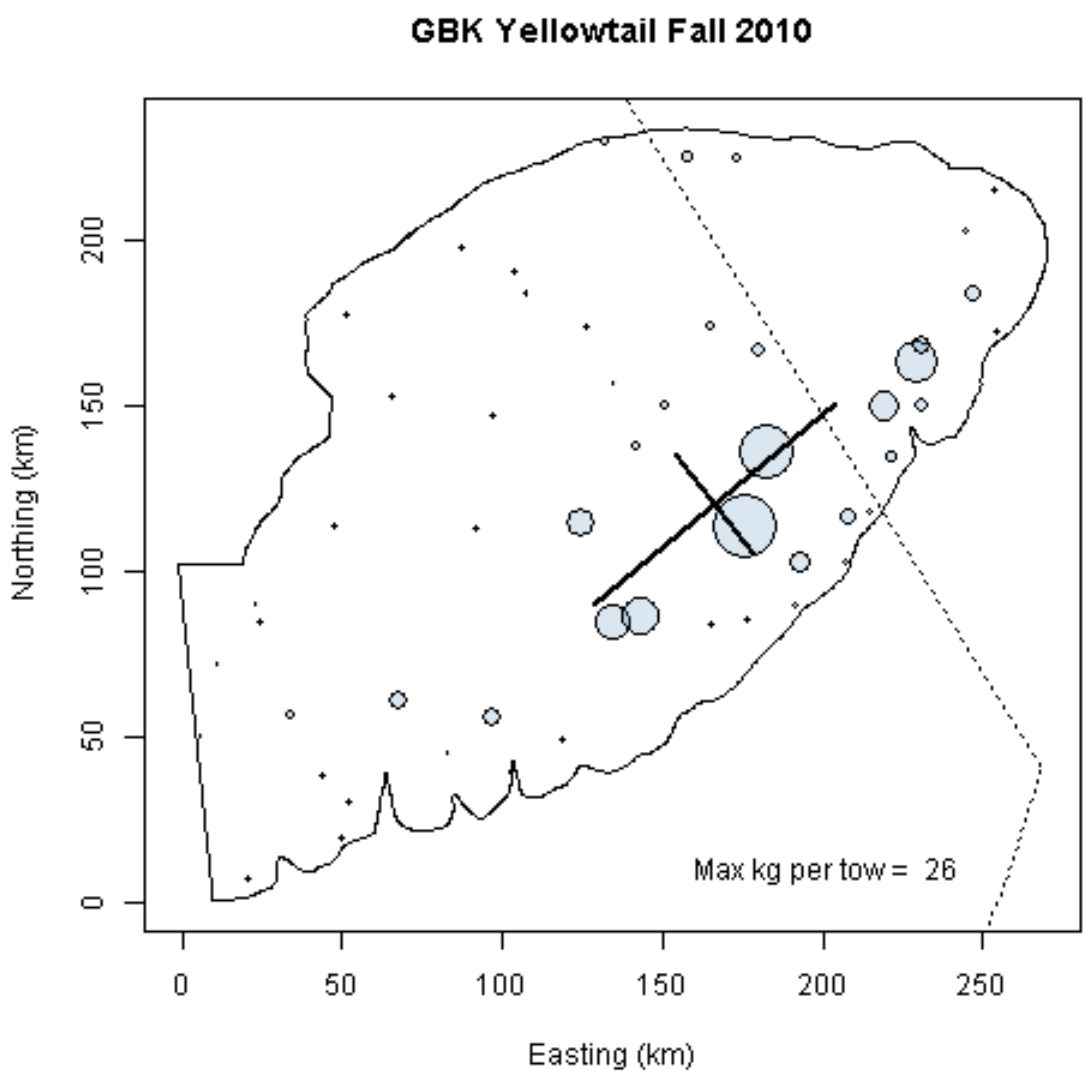

GBK Yellowtail Fall 2005
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 37

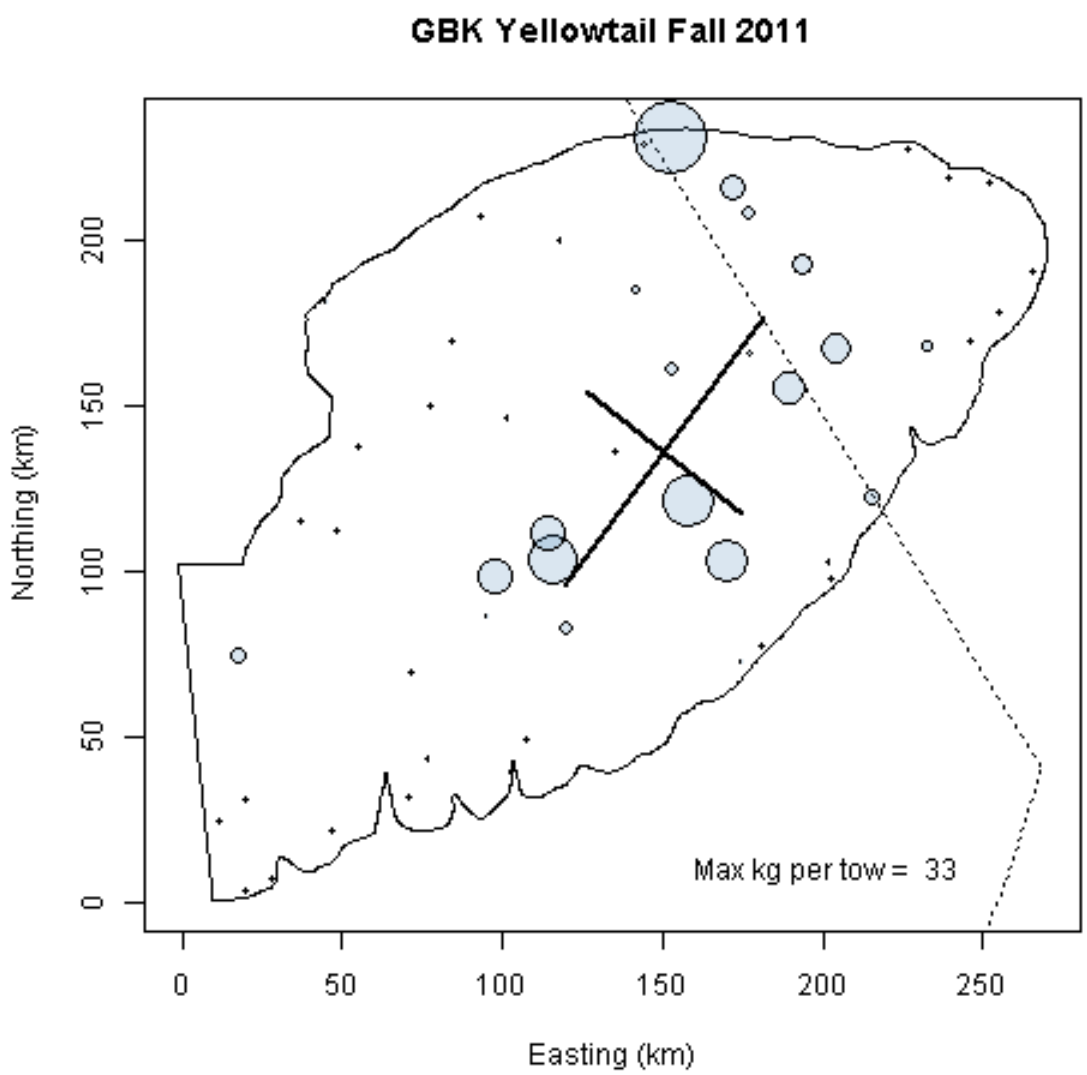

GBK Yellowtail Fall 2006
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 57

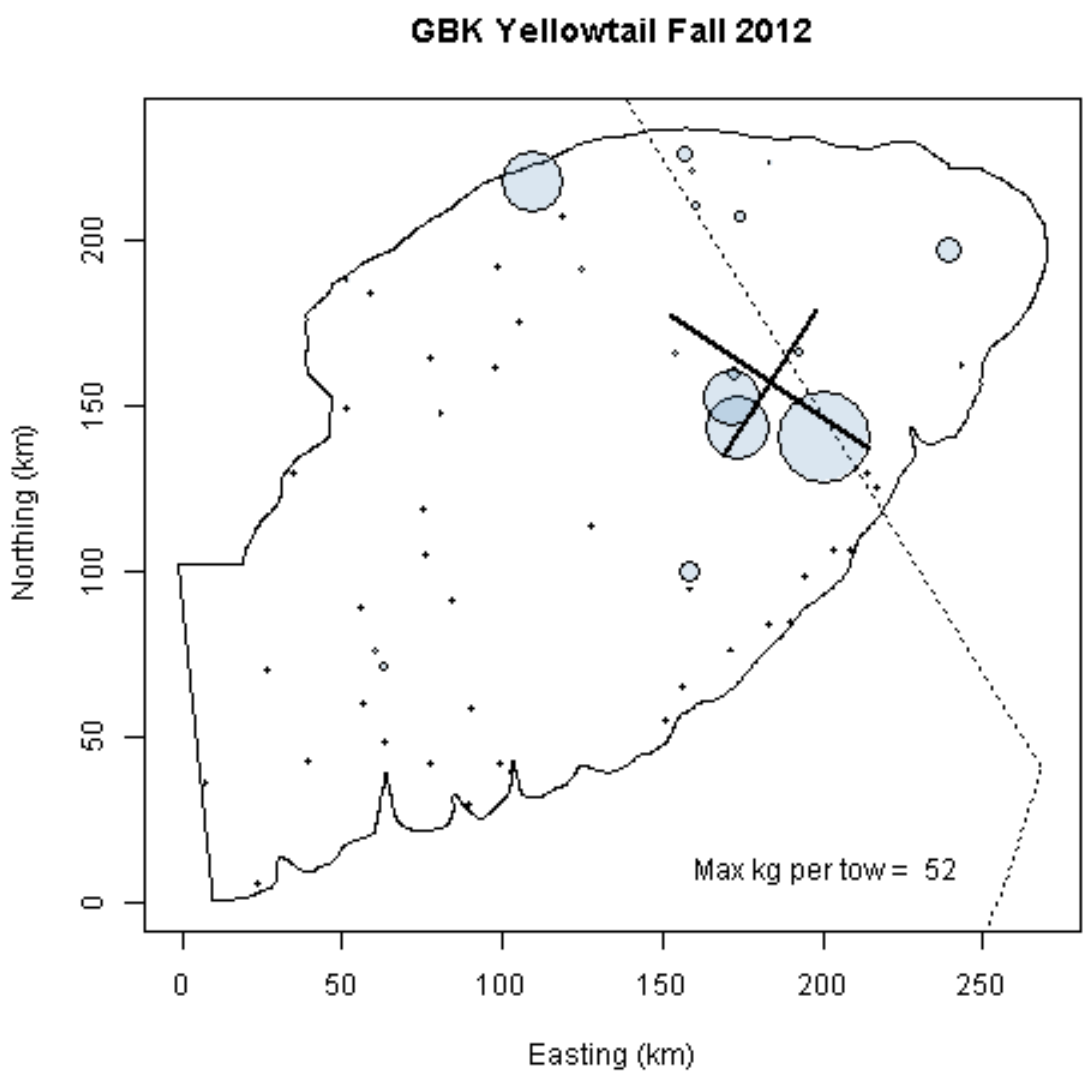

GBK Yellowtail Fall 2007
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 176

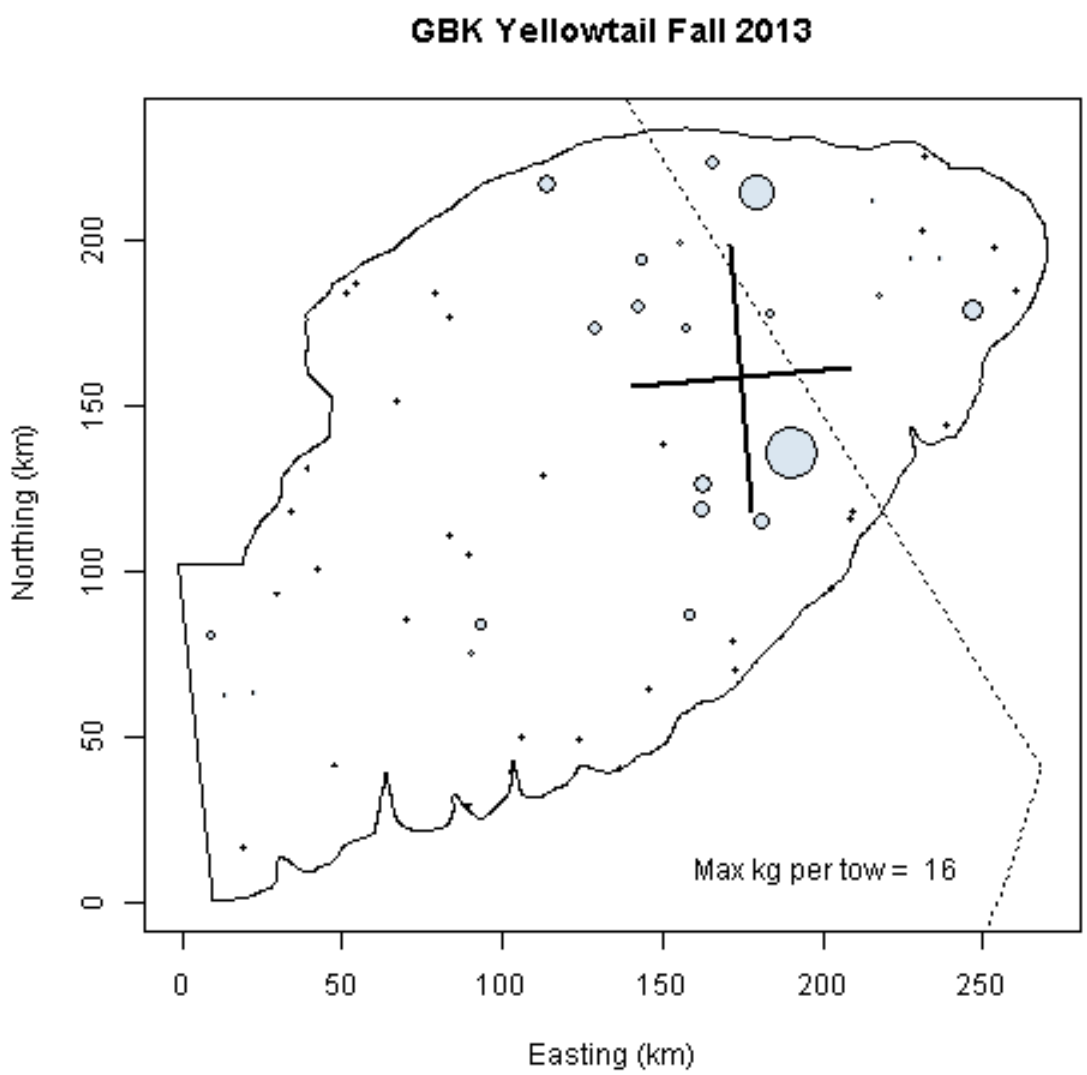

GBK Yellowtail Fall 2008
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 116

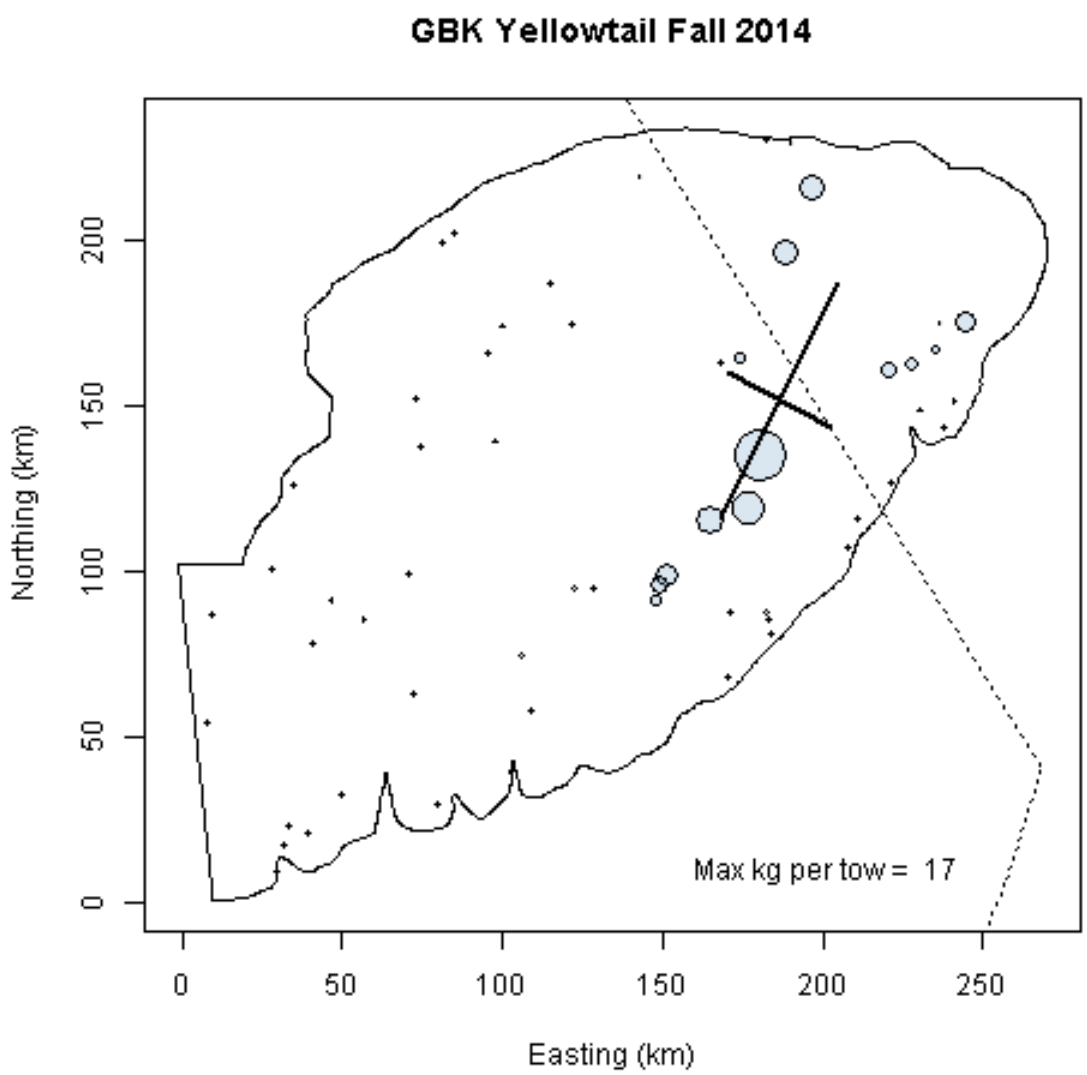

GBK Yellowtail Fall 2009
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 80

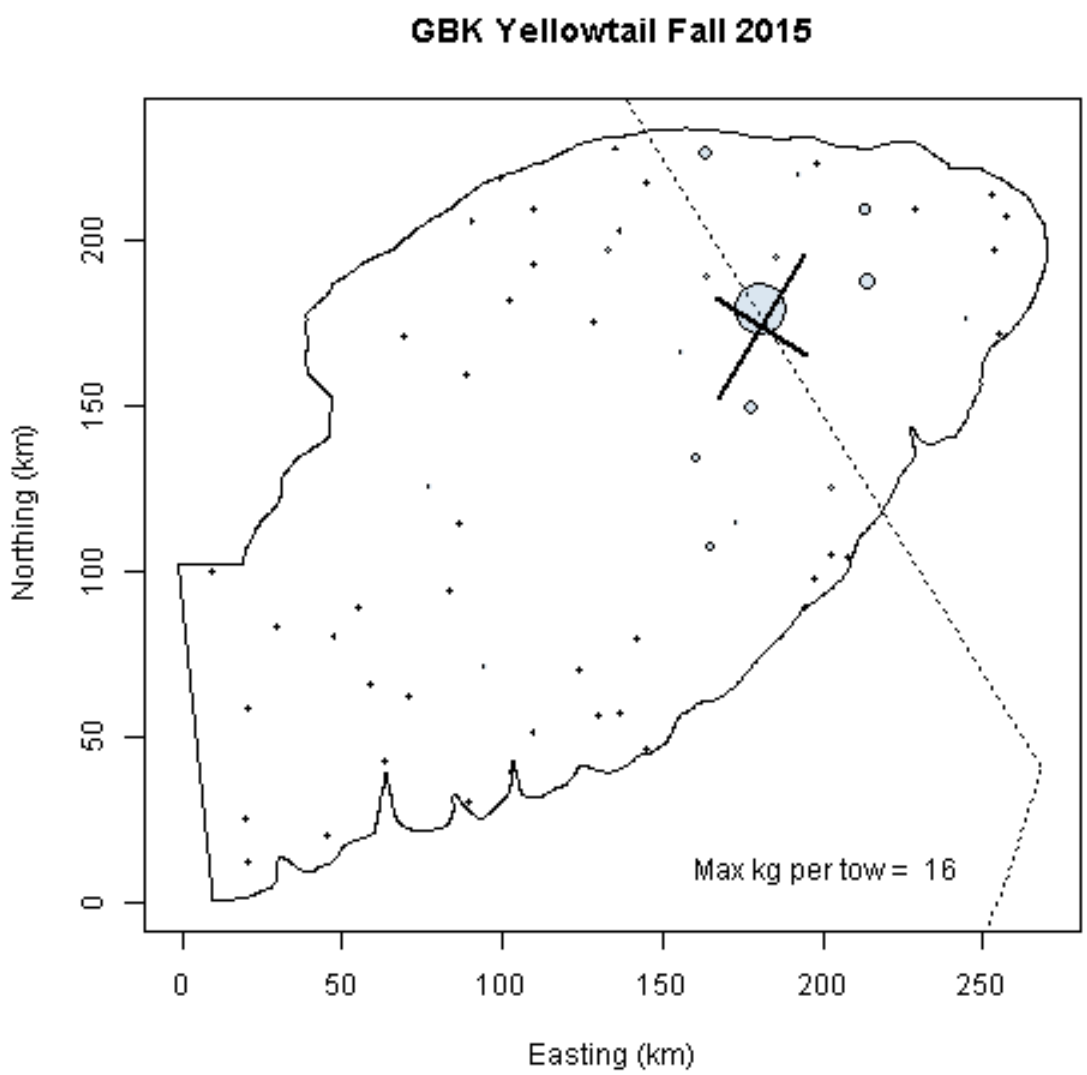

GBK Yellowtail Fall 2010
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 26

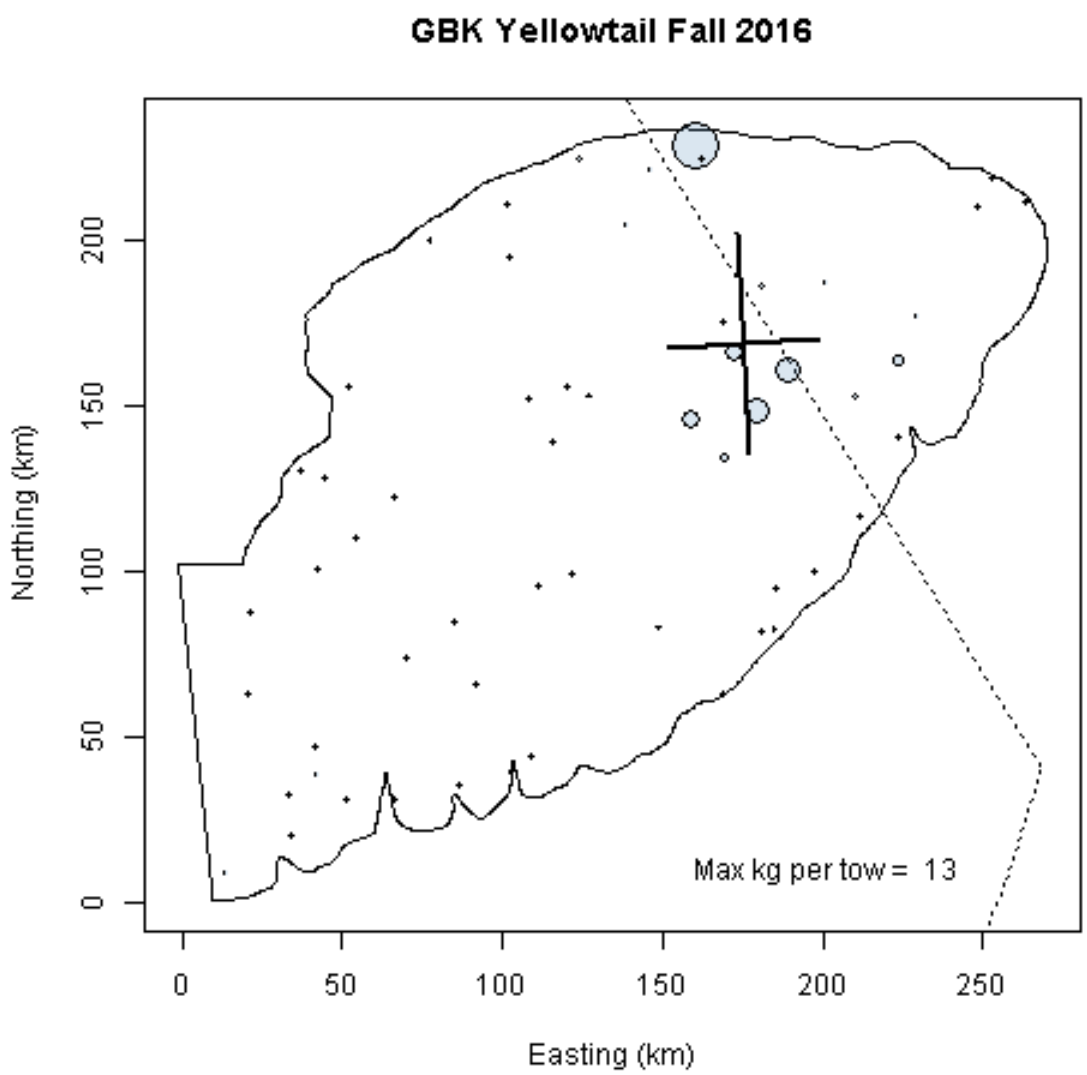

GBK Yellowtail Fall 2011
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 33

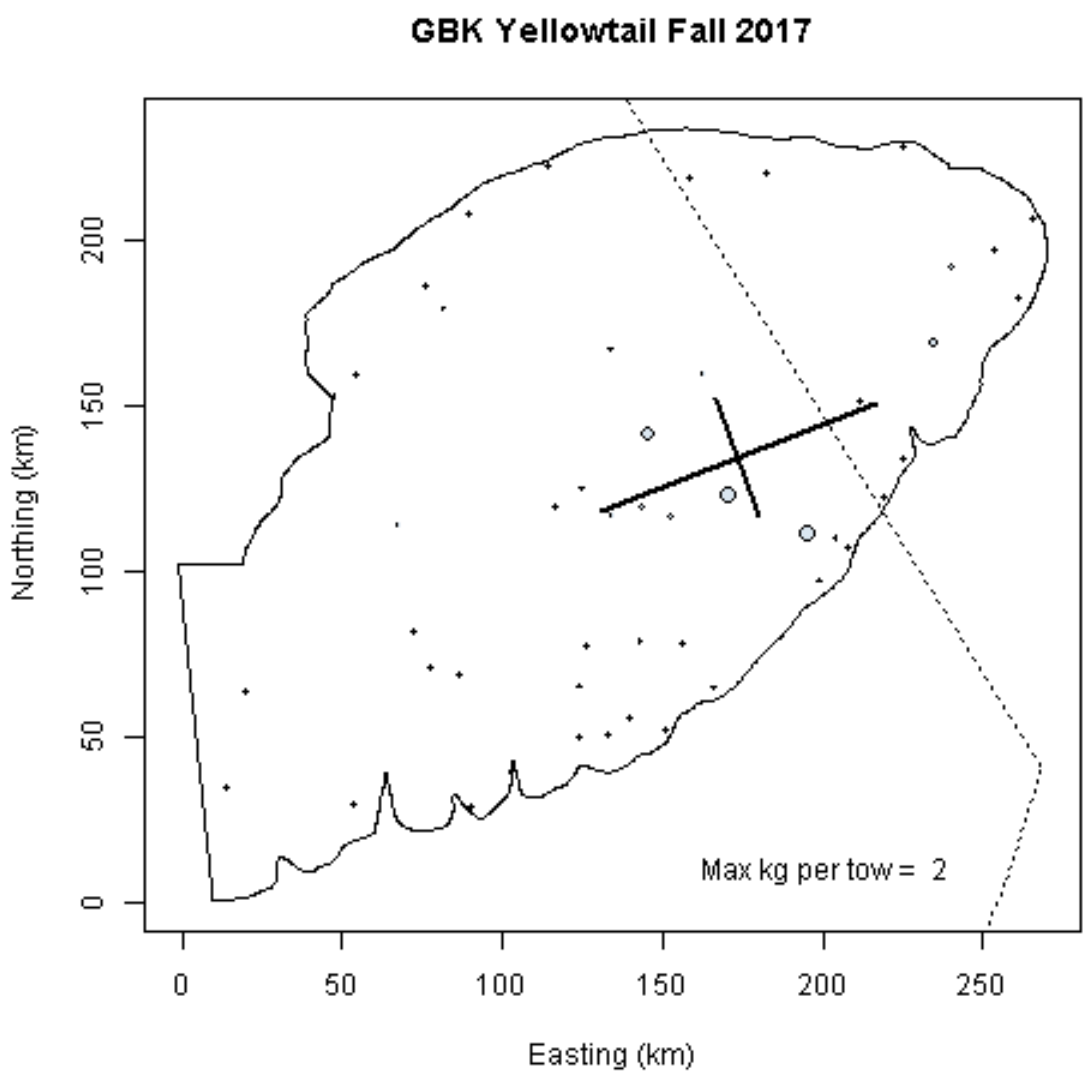

GBK Yellowtail Fall 2012
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 52


GBK Yellowtail Fall 2013
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 16

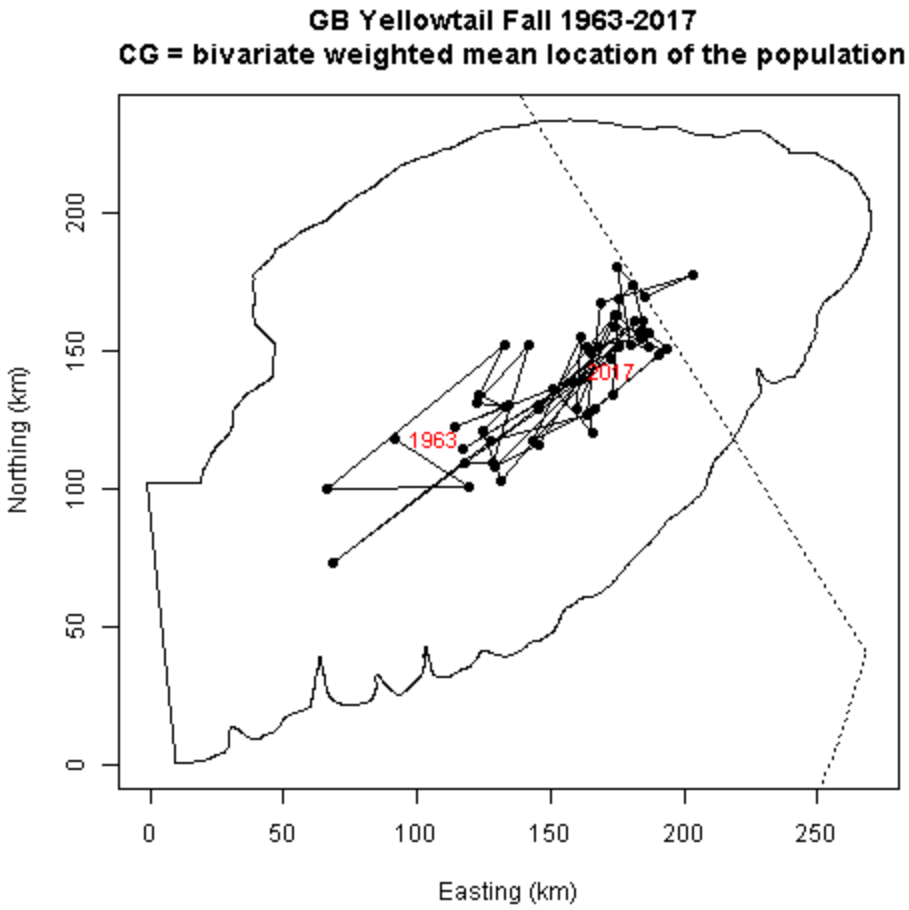

GBK Yellowtail Fall 2014
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 17


GBK Yellowtail Fall 2015
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 16

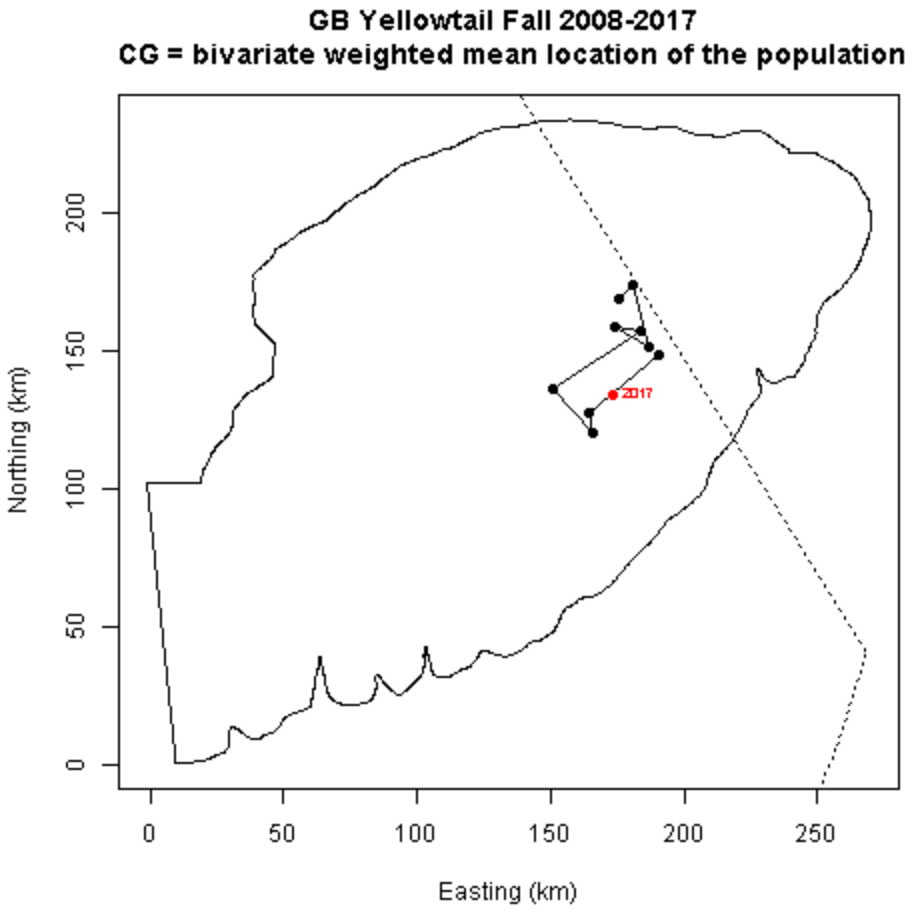

GBK Yellowtail Fall 2016
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 13

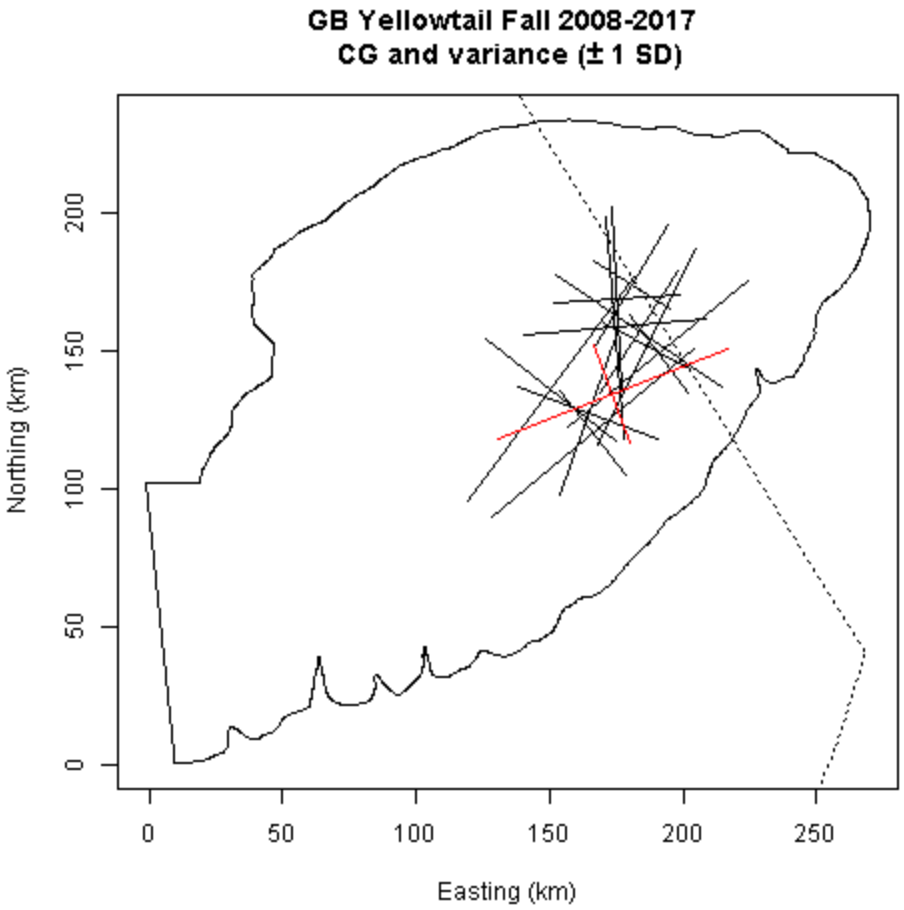

GBK Yellowtail Fall 2017
Northing (km)
Easting (km)
0
50
100
150
200
250
Max kg per tow = 2

Results: GB Yellowtail Flounder



Results: GB Yellowtail Flounder





Conclusions

- Mean locations of all three stocks in 2017 were within ± 1 SD of other CGs over the past decade for the respective stocks
- In terms of spatial distribution there should be no impact of the delayed 2017 fall survey on the assessments

Relevant Literature

- Adams CF, Alade LA, Legault CM, O'Brien L, Palmer MC, Sosebee KA, Traver ML. 2018. Relative importance of population size, fishing pressure and temperature on the spatial distribution of nine Northwest Atlantic groundfish stocks. PLoS ONE 13(4):e0196583 https://doi.org/10.1371/journal.pone.0196583