Spatial distribution and long-term dynamics of demersal fish biomass within East Sakhalin Current area, Sea of Okhotsk

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Total fish biomass distribution with (left) and without (right) walleye pollock

June 1994

Aug-Sept 2003

Oct-Nov 2007
The vertical and horizontal profiles of temperature and salinity of waters at Eastern Sakhalin Island in June 2012
Ranking of all fishes biomass by families in East Sakhalin waters in 1988-2012 (red arrow – Cottidae, Zoarcidae, blue – Pleuronectidae)

- 1988
- 1994
- 1999
- 2000
- 2003
- 2004
- 2007
- 2010
- 2012
Long-term dynamics of flat-fishes in north-eastern waters of Sakhalin Isl.

**Graph:**
- **Reinhardtius h. matsuurae**
- **Glyptocephalus stelleri**
- **Platichthys stellatus**
- **Pleuronectes quadrituberculatus**
- **Hippoglossoides robustus**
- **Limanda aspera**
- **Limanda sakhalinensis**

**Equations:**
- $R^2 = 0.45$
- $R^2 = 0.82$
- $R^2 = 0.80$
- $R^2 = 0.89$
- $R^2 = 0.22$
- $R^2 = 0.91$
- $R^2 = 0.65$
- $R^2 = 0.43$

**Legend:**
- Relative biomass, ton/sq. miles
- Relative biomass of Platycthis stellatus and family Pleuronectidae as a whole, ton/sq. miles
- Polynomial regression (Reinhardtius h. matsuurae)
- Polynomial regression (Pleuronectes quadrituberculatus)
- Polynomial regression (Hippoglossoides robustus)
- Polynomial regression (Limanda aspera)
- Polynomial regression (Limanda sakhalinensis)
- Exponential regression (Platichthys stellatus)
- Exponential regression (All flat-fish)
Long-term dynamics of cottid-fishes in north-eastern waters of Sakhalin Isl.

Melletes papilio

Myoxocephalus polyacanthocephalus

Myoxocephalus jaok

Enophrys diceraus

\[ R^2 = 0.43 \]
\[ R^2 = 0.59 \]
\[ R^2 = 0.24 \]
\[ R^2 = 0.39 \]
Long-term dynamics of *gadid-fishes* in north-eastern waters of Sakhalin Isl.

\[ R^2 = 0.85 \]

\[ R^2 = 0.31 \]

- **Theragra chalcogramma**
- **Eleginus gracilis**

Polyinominal (Theragra chalcogramma)
Polyinominal (Eleginus gracilis)
Species arrangement on average relative biomass, tons/sq. miles by logarithm scale

- Theragra chalcogramma: 34.96
- Platichthys stellatus: 2.84
- Eleginus gracilis: 0.76
- Melletes papillo: 0.63
- Bathyraja parmifera: 0.63
- Myoxocephalus polyacanthocephalus: 0.39
- Reinhardtius h. matsuare: 0.24
- Myoxocephalus jaok: 0.20
- Hypoglossoides robustus: 0.15
- Pleuronectes quadrituberculatus: 0.14
- Gadus macrocephalus: 0.13
- Glyptocephalus stelleri: 0.12
- Limanda sakhalinensis: 0.09
- Icelus spiniger: 0.06
- Limanda aspera: 0.05
- Enophrys diceraus: 0.02
Long-term fish dynamics in West Kamchatka (Savin et al., 2011), South Kuril and East Sakhalin waters of the Sea of Okhotsk.

West Kamchatka

South Kuril

East Sakhalin

Average relative biomass, ton/sq. miles


0 5 10 15 20 25 30 35 40

All fish
Demersal fish
Theragra chalcogramma

Average relative biomass, ton/sq. miles


0 10 20 30 40 50 60

All fish
Pleuronectidae
Gadidae
Cottidae
Theragra chalcogramma

Average relative biomass, ton/sq. miles


0 5 10 15 20 25 30

All fish
Demersal fish
Theragra chalcogramma

Average relative biomass, ton/sq. miles


0 5 10 15 20 25 30 35 40 45 50 55 60

All fish
Pleuronectidae
Gadidae
Cottidae
Hexagrammidae
Theragra chalcogramma

 Polynomial (All fish)
 Polynomial (Demersal fish)
 Polynomial (Theragra chalcogramma)
Long-term fish dynamics in West Kamchatka (Savin et al., 2011), South Kuril and East Sakhalin waters of the Sea of Okhotsk.
Summary

- In the Sea of Okhotsk the long-term dynamics of demersal fish communities at three observing areas had similar trends of changes;
- North-eastern Sakhalin waters reflects some lagging of growth or decline of all demersal fish biomass from another areas;
- The walleye pollock resources have similar trends of its biomass in southern and northern parts of the sea with some lagging of the dynamics in first area;
- Main factor caused delay of demersal fish biomass trend in northeastern Sakhalin area might be the severe ambient in northwestern part of the sea;
- Variable habitat influences the demersal fish communities changing their biomass according to preferences of species.