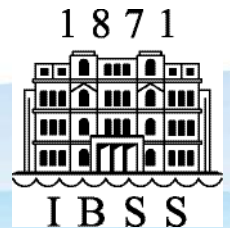
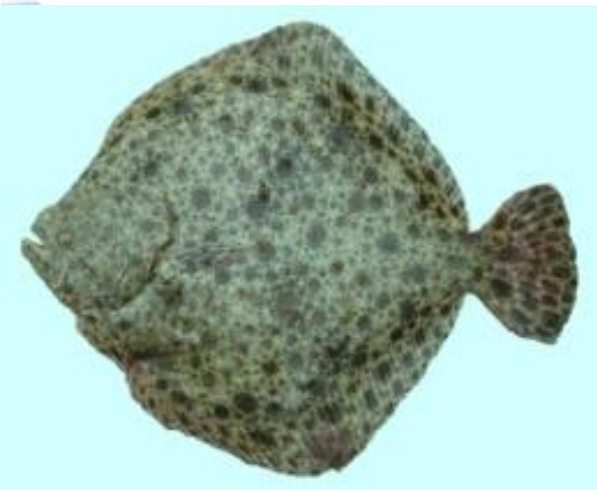


International Conference
“MARINE RESEARCH HORIZON 2020”
September 17-20 2013,
Golden Sands, Varna, Bulgaria



TRENDS IN THE BLACK SEA TURBOT POPULATION STATUS IN SEVASTOPOL AREA (1998 - 2013)

Giragosov V., Khanaychenko A., Smirnov D.



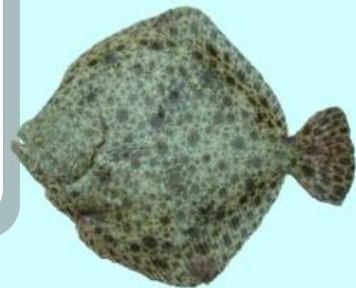
***Institute of Biology of Southern Seas
Sevastopol, UKRAINE***

AIM:

**To evaluate the trends in the state-of-art
of the Black Sea turbot
spawning population
from the gill nets
in Sevastopol region
(South-Western Crimean shelf)
during mid April – mid June
TIME-SERIES 1998 – 2013**



**To make an attempt to identify specific
DRIVERS related to changes in
BIOLOGICAL INDICATORS of the Black Sea
turbot population in Sevastopol area**



Study area and fishing gears:



Area of sampling
44°30' - 44°42' N 33°05' - 33°28' E



Turkish turbot

Study area: Crimean South-Western shelf

Gear: gill nets - mesh opening 200 mm

Depths: 25 - 95 m (99% of catches from the depths over 50 m)

METHODS:

Standard

Biological and morphological analysis (TL, SL, Wtotal, gender, GSI, etc) (1998 - 2013)

Digital monitoring for morphological and pigmentation norm and abnormalities, visually detected diseases (2007 -2013)

Sampling for anti-oxidant activity of BST tissues (2007 -2009)

Monitoring of individual fecundity (2007 -2013)

Monitoring of sperm activity and eggs quality (2007 – 2013)

Sampling for POPs and DDT analysis (2007, 2013)

Sampling for genetic (microsatellite) analysis (2009 - 2010) in collaboration with Belgium (KULeuven and ILVO)

BIOLOGICAL KEY INDICATORS:



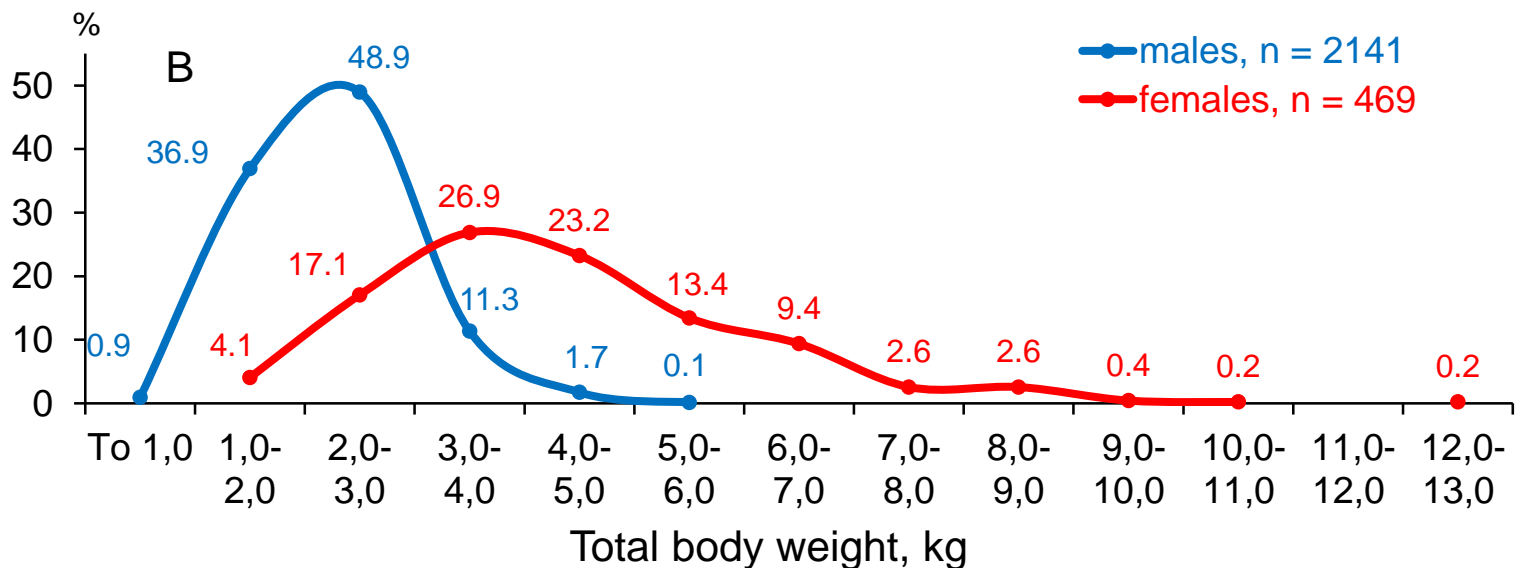
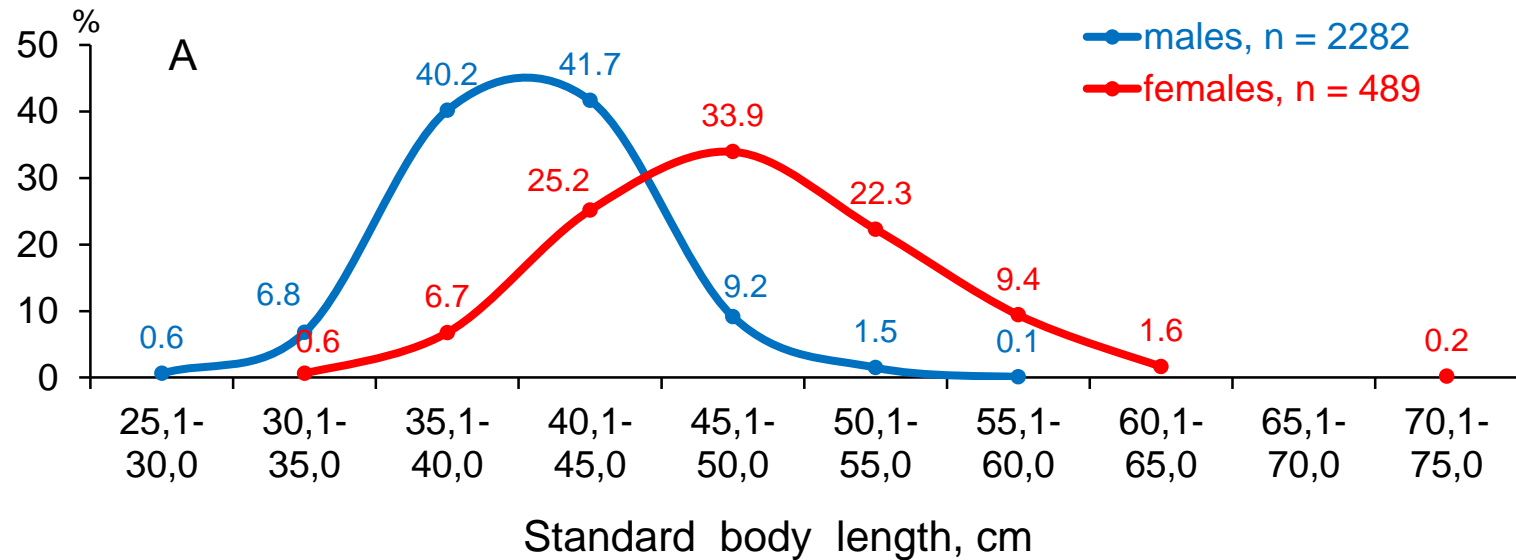
POPULATION STRUCTURE: SIZE Distribution

POPULATION STRUCTURE: GENDERS RATIO

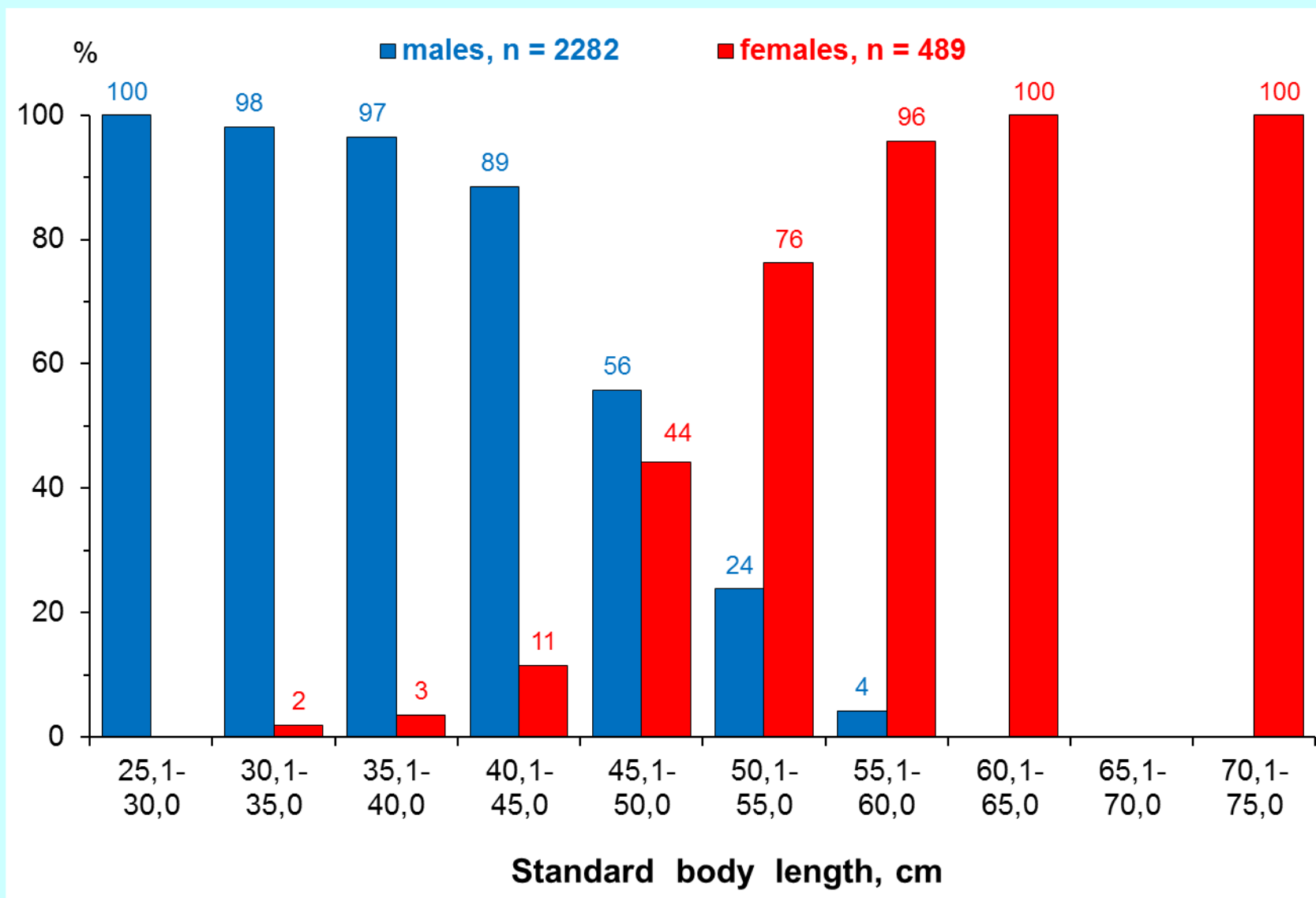
Proportion of METAMORPHOSIS DEFECTS

Proportion of DISEASED FISH

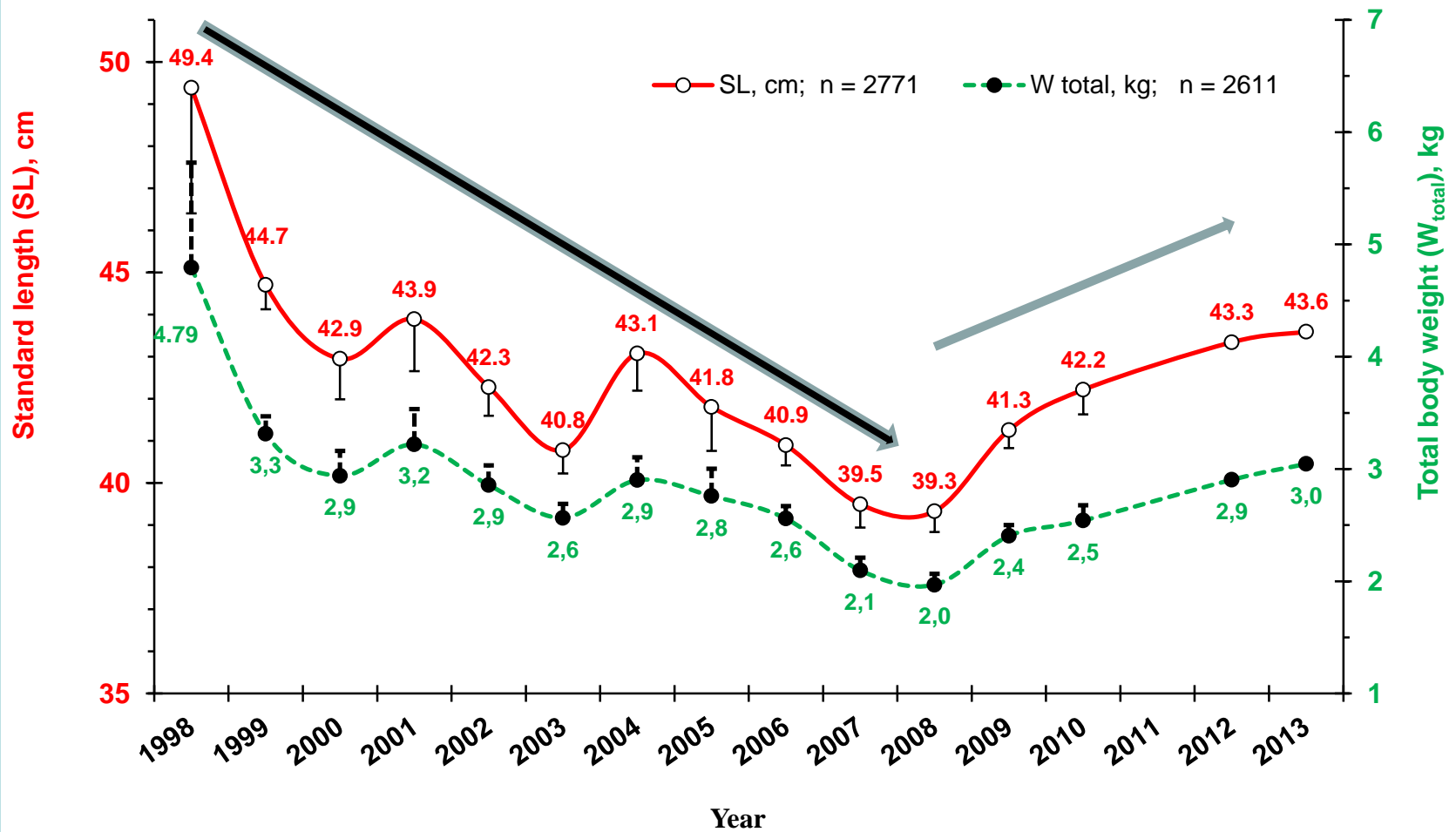
GES Criterion 3: GENERALIZED (1998 -2013) turbot Length - and Weight- frequency distribution



Generalized (pooled data 1998 - 2013) sex-related turbot length-frequency distribution

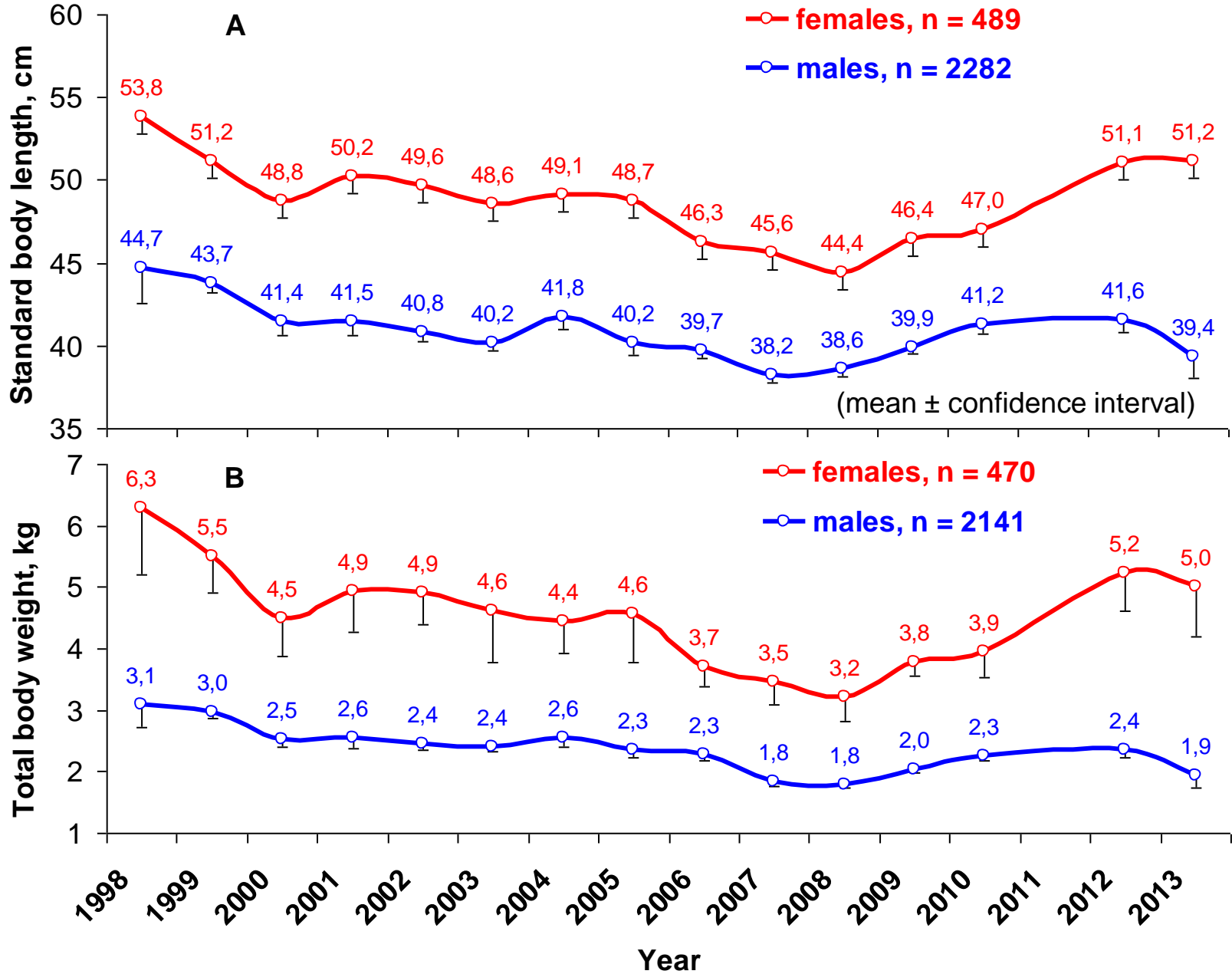


GES Criterion 3: Trends in Turbot Mean Population Standard Length and Weight 1998 - 2013

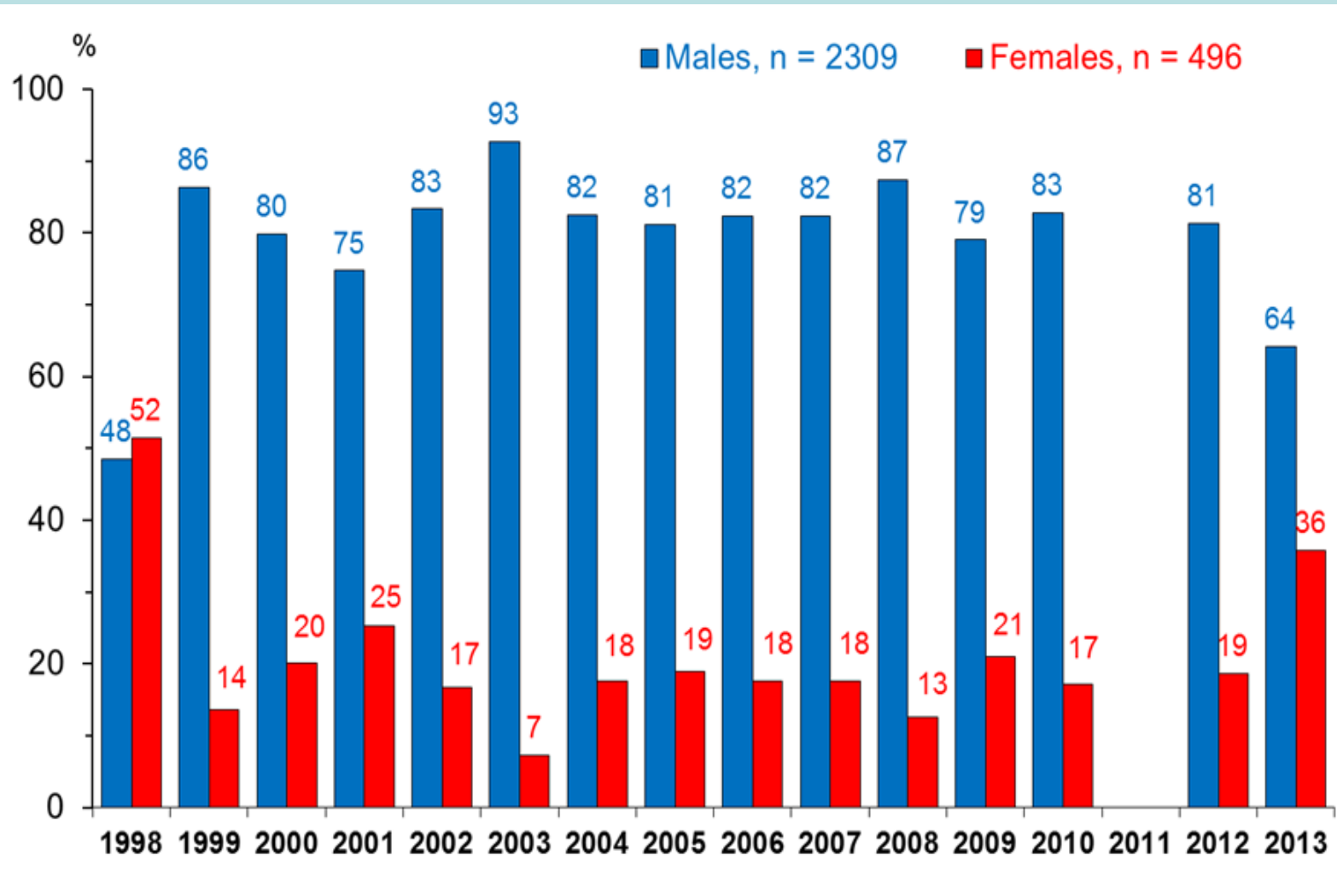


Drastic changes in BST population structure from 1998 till 2008
Minor improvement from 2008 to 2012

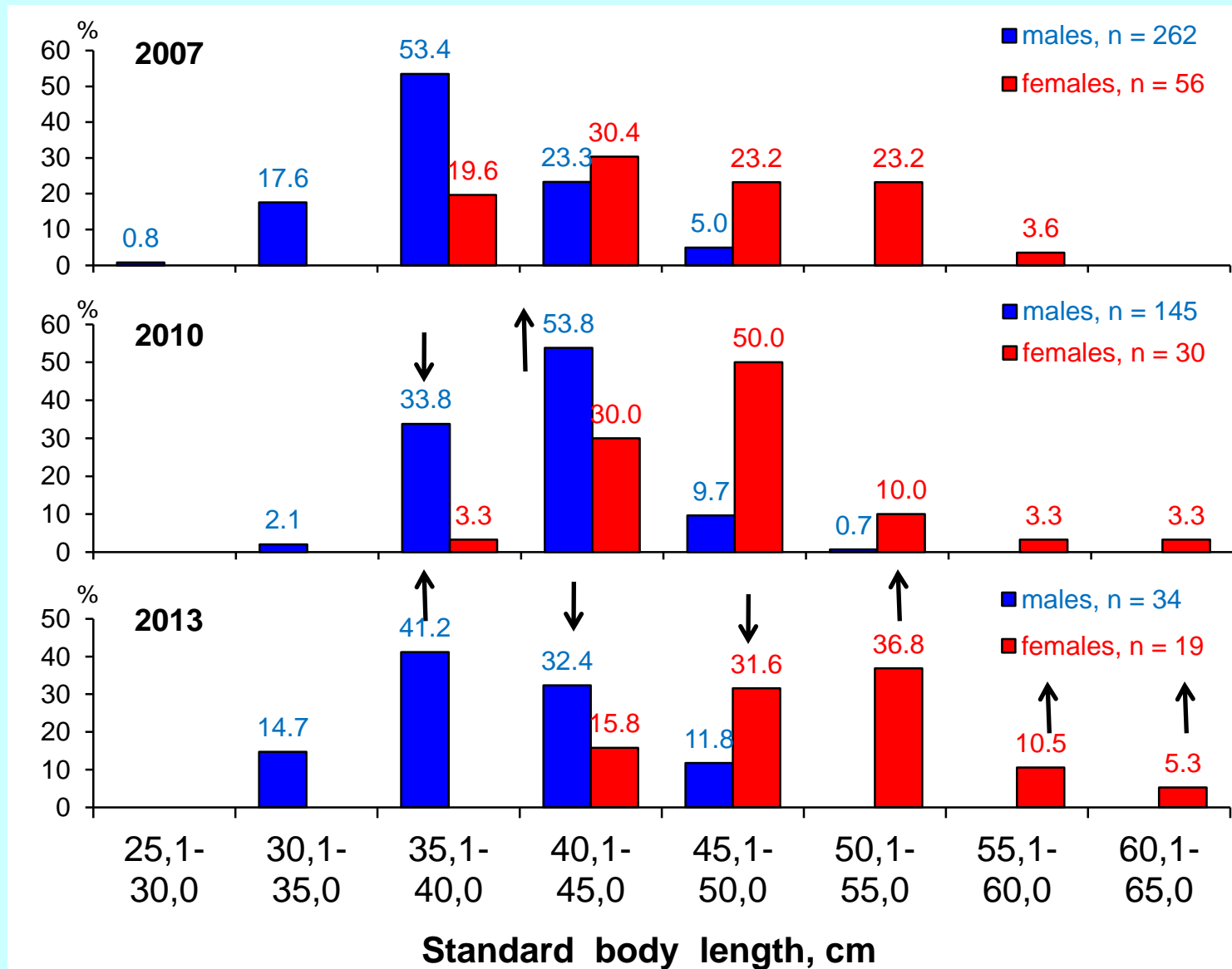
GES Criterion 3: Turbot Length and Weight



Trends in Turbot GENDERS RATIO

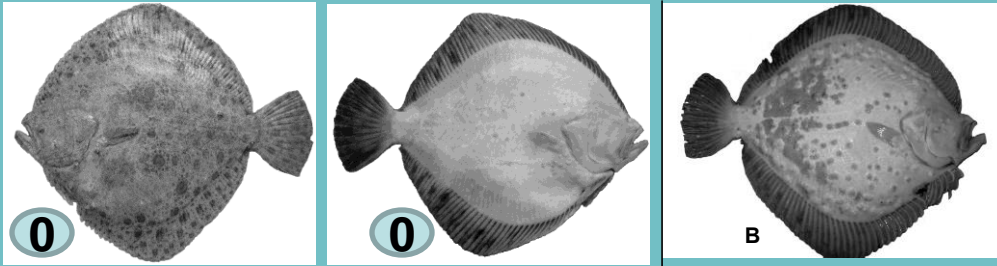


Trends in turbot Standard Length FREQUENCY

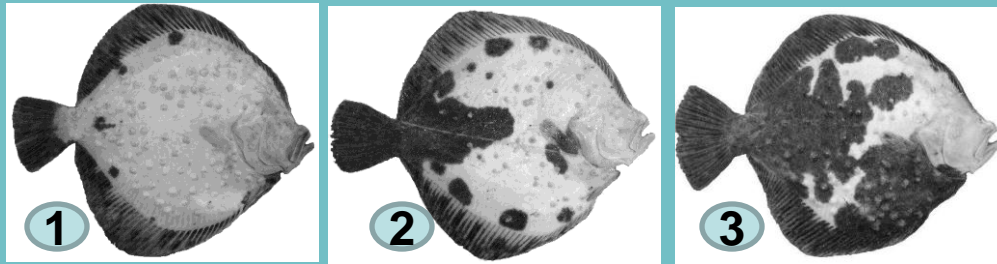




NEW INDICATOR - METAMORPHOSIS DEFECTS



Types and grades (0 - 6) of BS normal/abnormal pigmentation



Abnormal pigmentation—
abnormal gene expression –
result of disproportion of
essential components in food

DURING

Early Development

(IRREVERSIBLE)



In 90% grade 6 and 67% grade 5 coincide with incomplete eye migration.

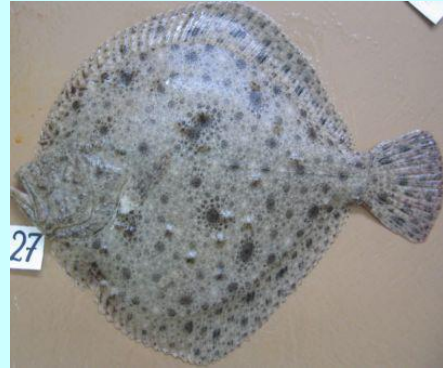
Mean size/weight of grades 5 - 6 was significantly lower than mean total at age .

DRIVING FORCE of metamorphosis defects: FOOD

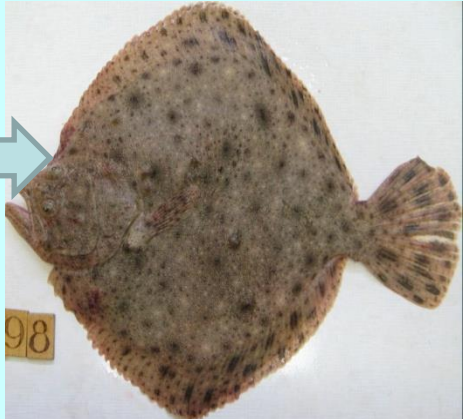
EXPERIMENT

NATURE

BALANCE of A,
D, PUFA



Disbalance
A and D vit



Disbalance
PUFA and
aminoacids

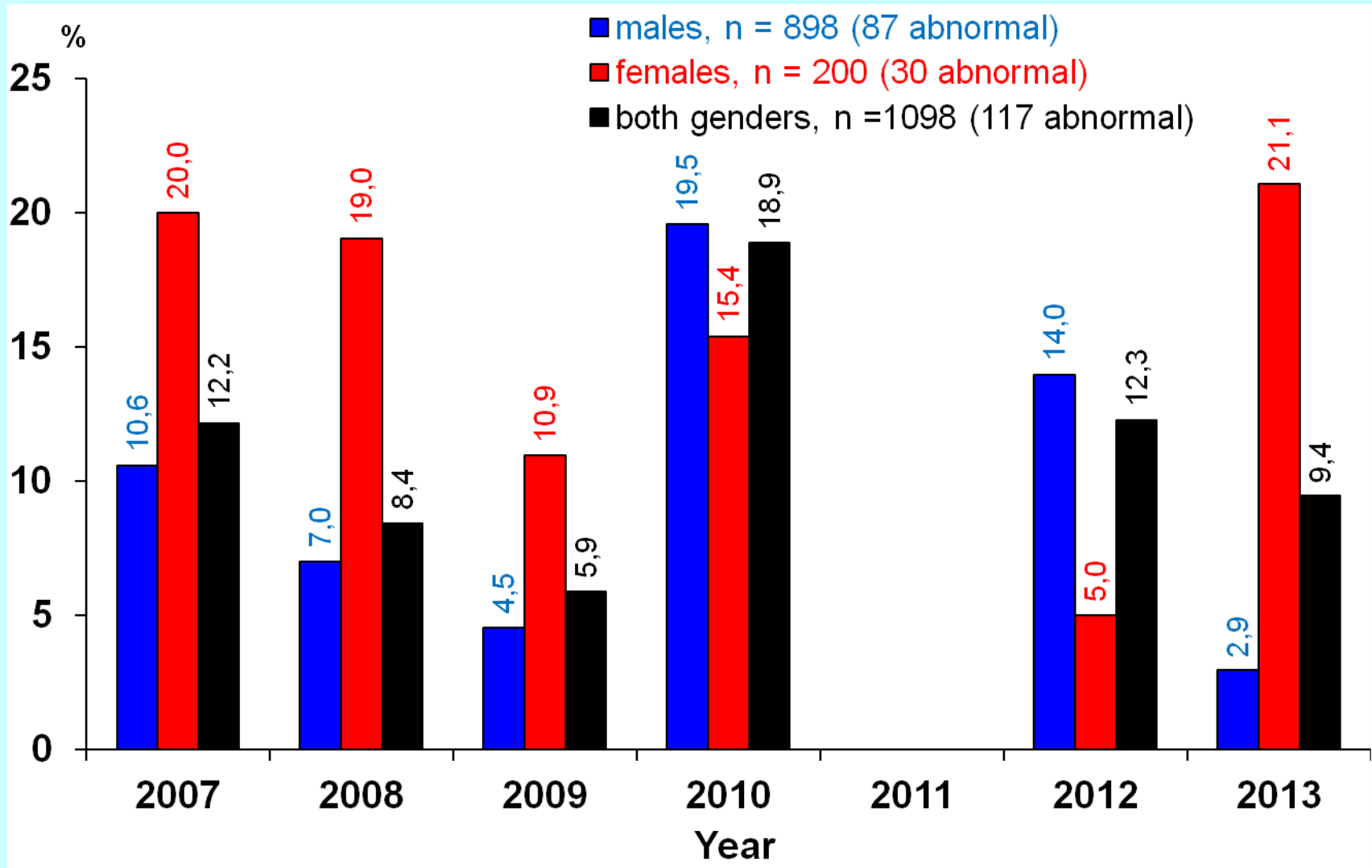


DRIVER:
**Deterioration of
Planktonic
food web:
zooplankton !
phytoplankton?**



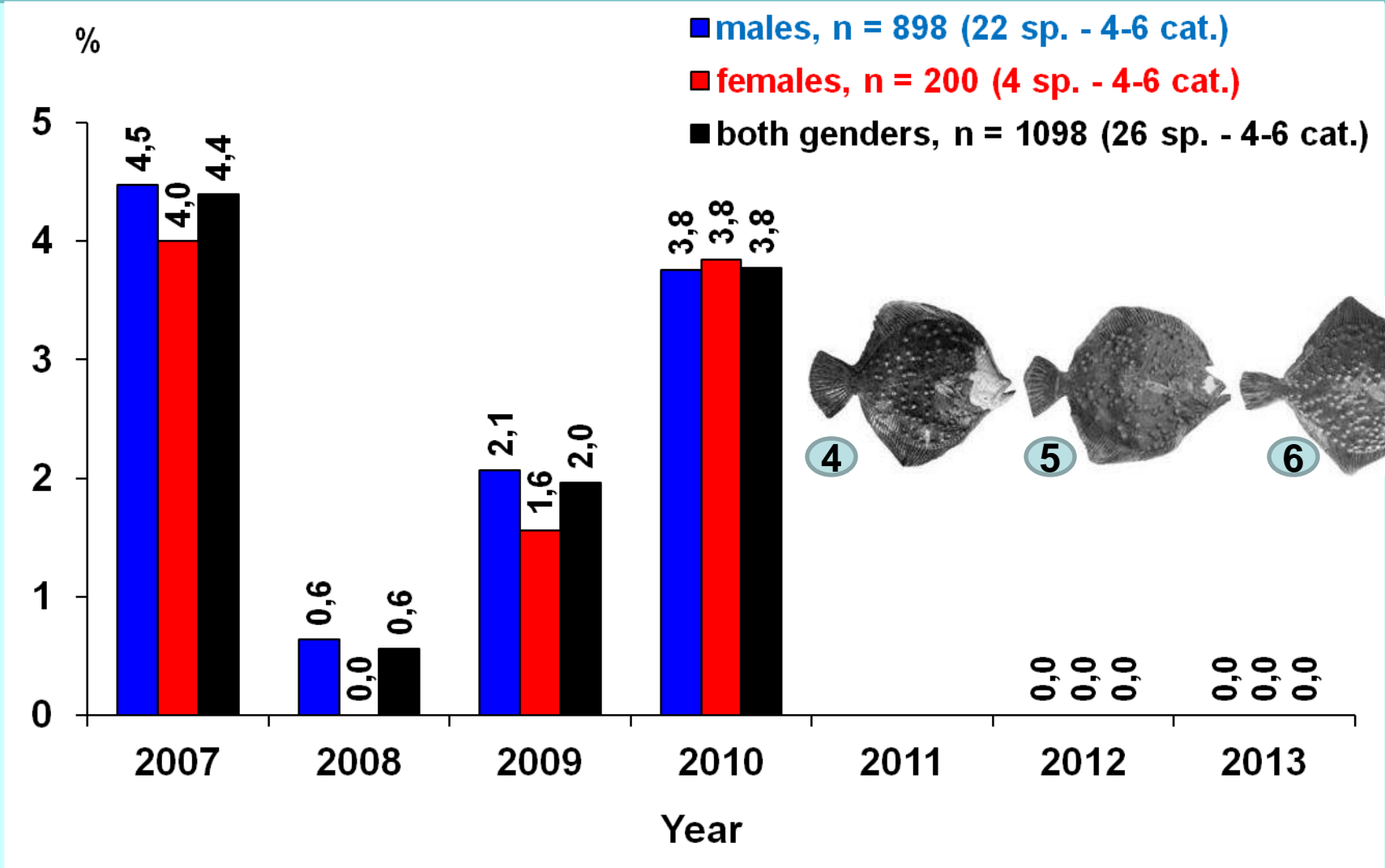
HIGH MORTALITY 0-group in GENERATION with high% METAMORPHOSIS defects

TRENDS in turbot METAMORPHOSIS DEFECTS - 1



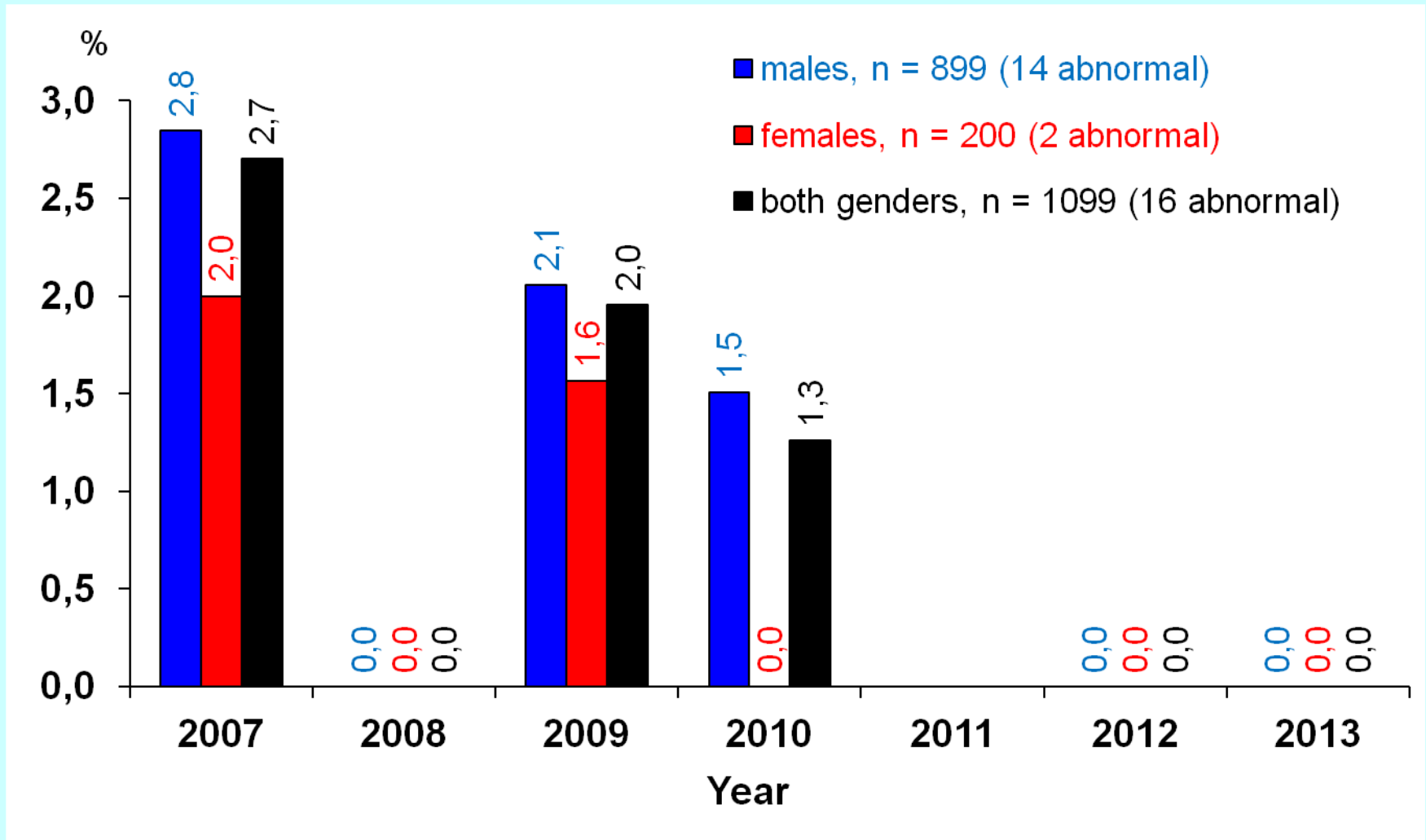
Share (%) of pigmentation abnormalities (1-6 categories) in males, females, and both genders groups (percentage of total specimens' number)

TRENDS in BST METAMORPHOSIS DEFECTS - 2



**Pigmentation abnormalities (4- 6 categories)% in population:
 INDICATOR of LOW survival of generations 1997 -2001**

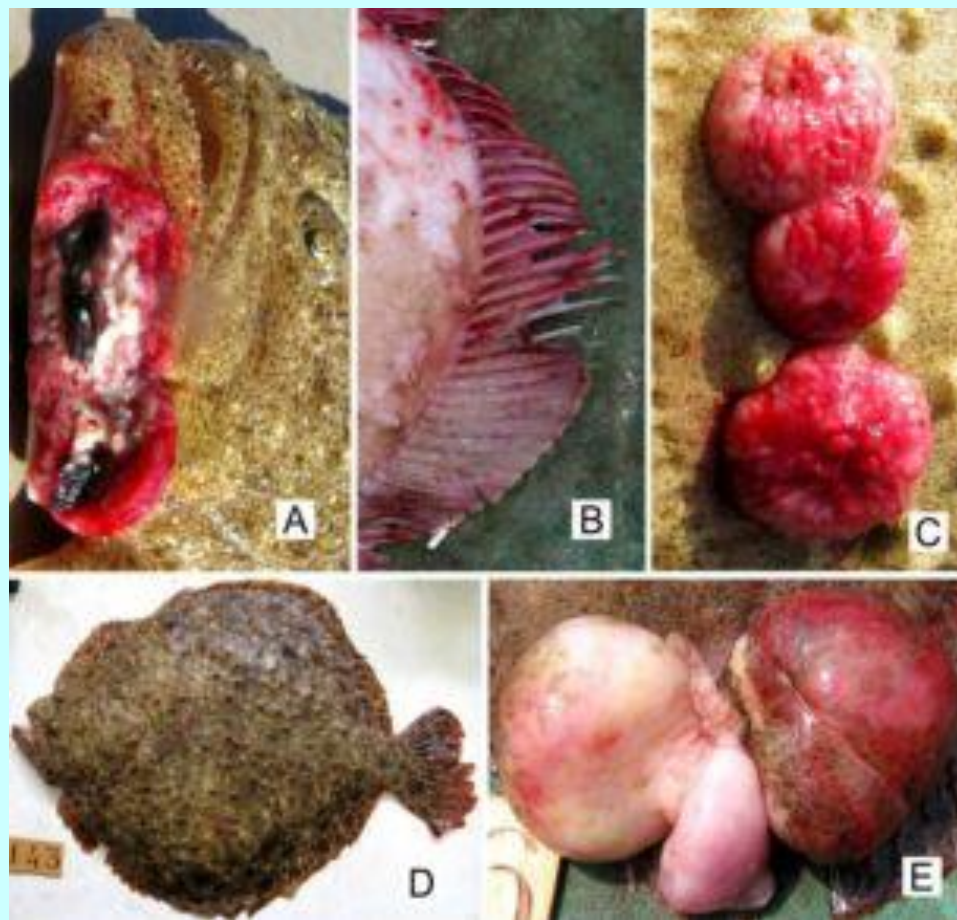
TRENDS in turbot METAMORPHOSIS DEFECTS - 3



**Incomplete right eye migration in turbot population:
INDICATOR of LOW survival of generations 1997 - 2001**

NEW INDICATOR - diseases frequency (health status) - grossly visible pathology of turbot

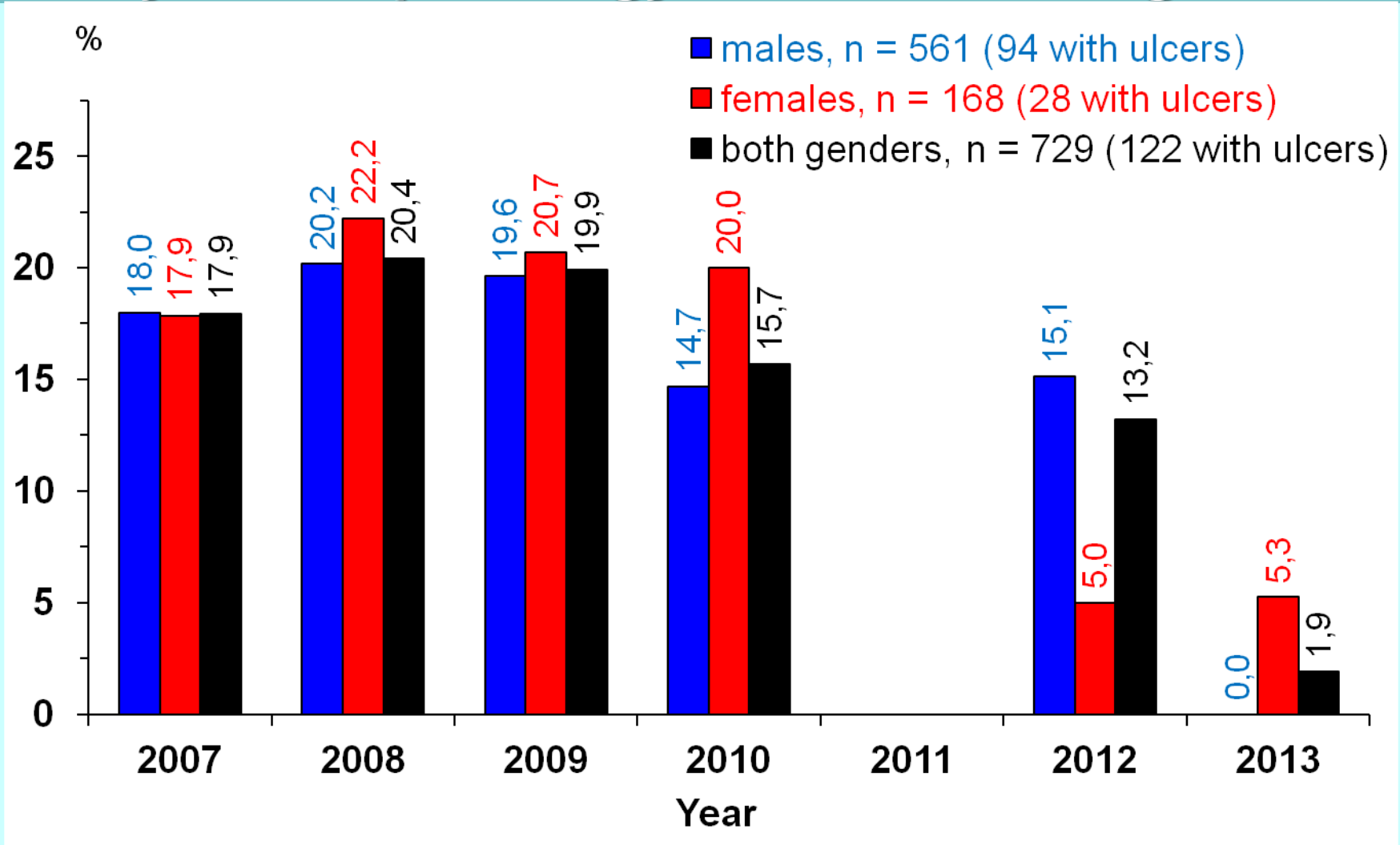
inflammation, ulcers, haemorrhages, neoplasms, tumours, fin erosion



**DRIVERS: 1) sewages; pollution and contamination of environment
2) physical destruction of habitats - feeding and spawning grounds**

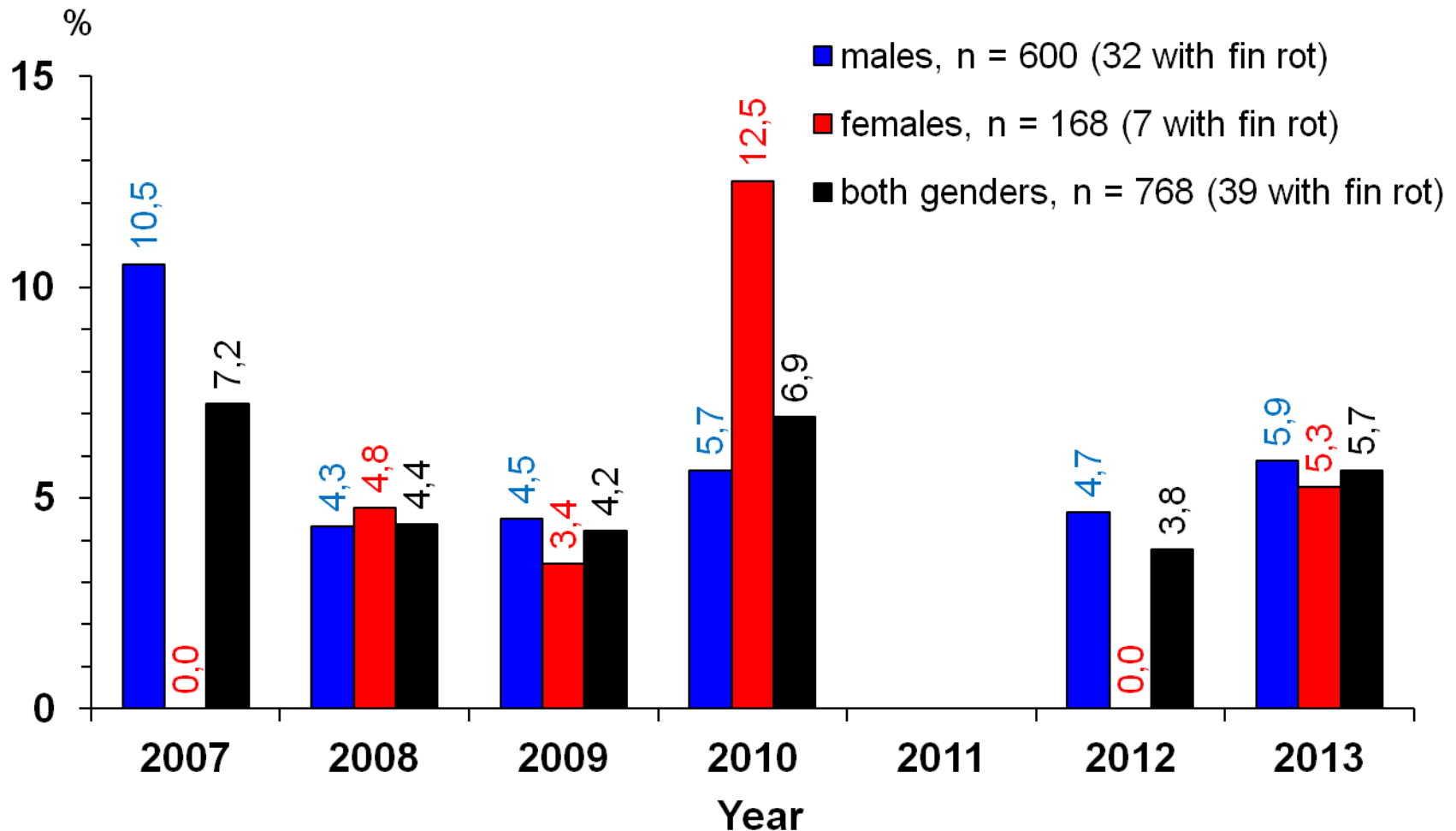
Trends in diseases frequency

grossly visible pathology – 1 - haemorrhagic ulcers



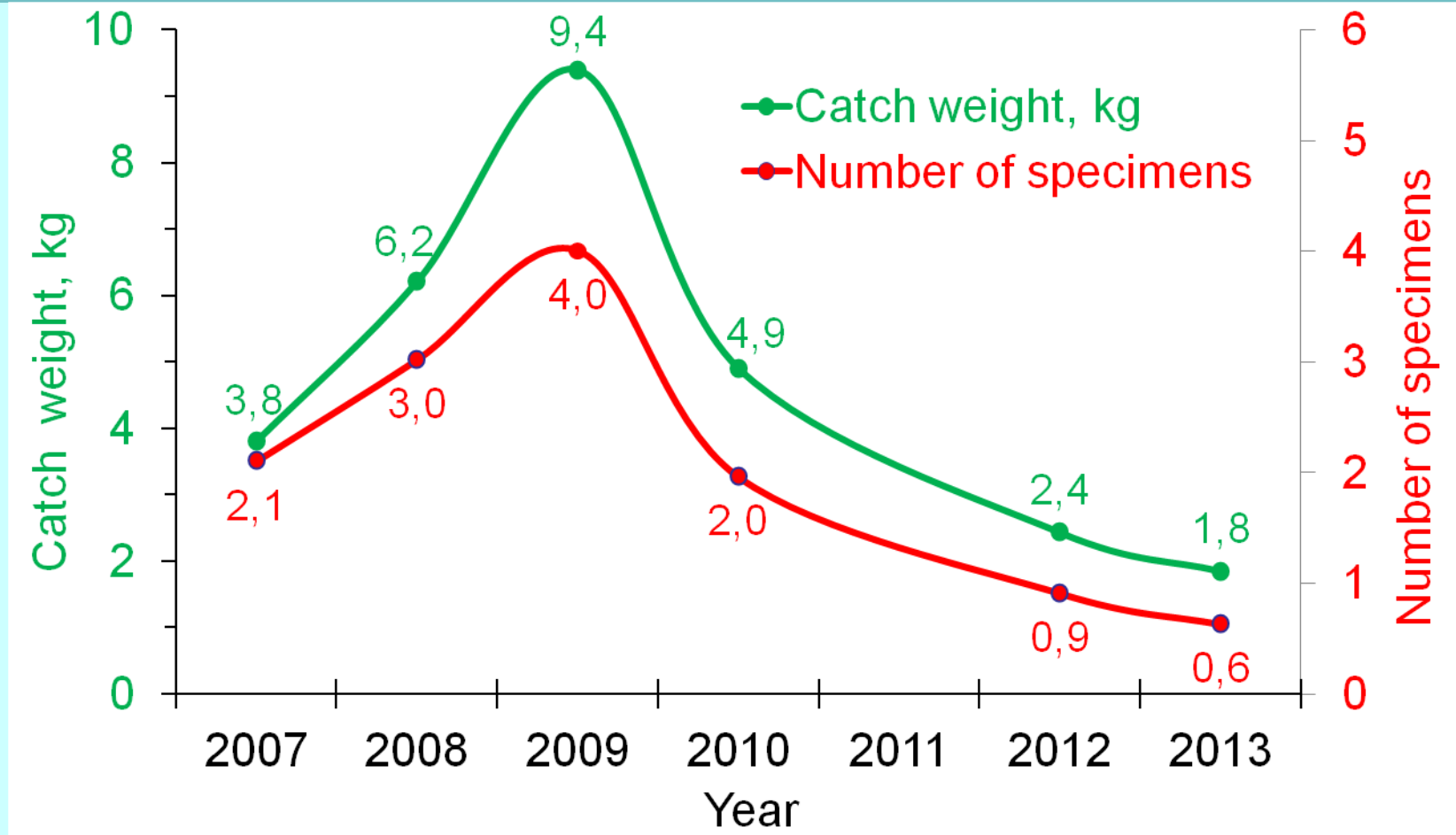
Share of specimens with hemorrhagic ulcers: males (% from total number of males), females (% from total number of females), and in total population - both sex groups (percentage of total studied fish number)

Trends in diseases frequency - - grossly visible pathology -2 – fin erosion



Share of BST affected fin rot: males (% from total number of males), females (% from total number of females), in total population - both sex groups (percentage of total studied fish number)

Relative catches (RC) of turbot off Sevastopol

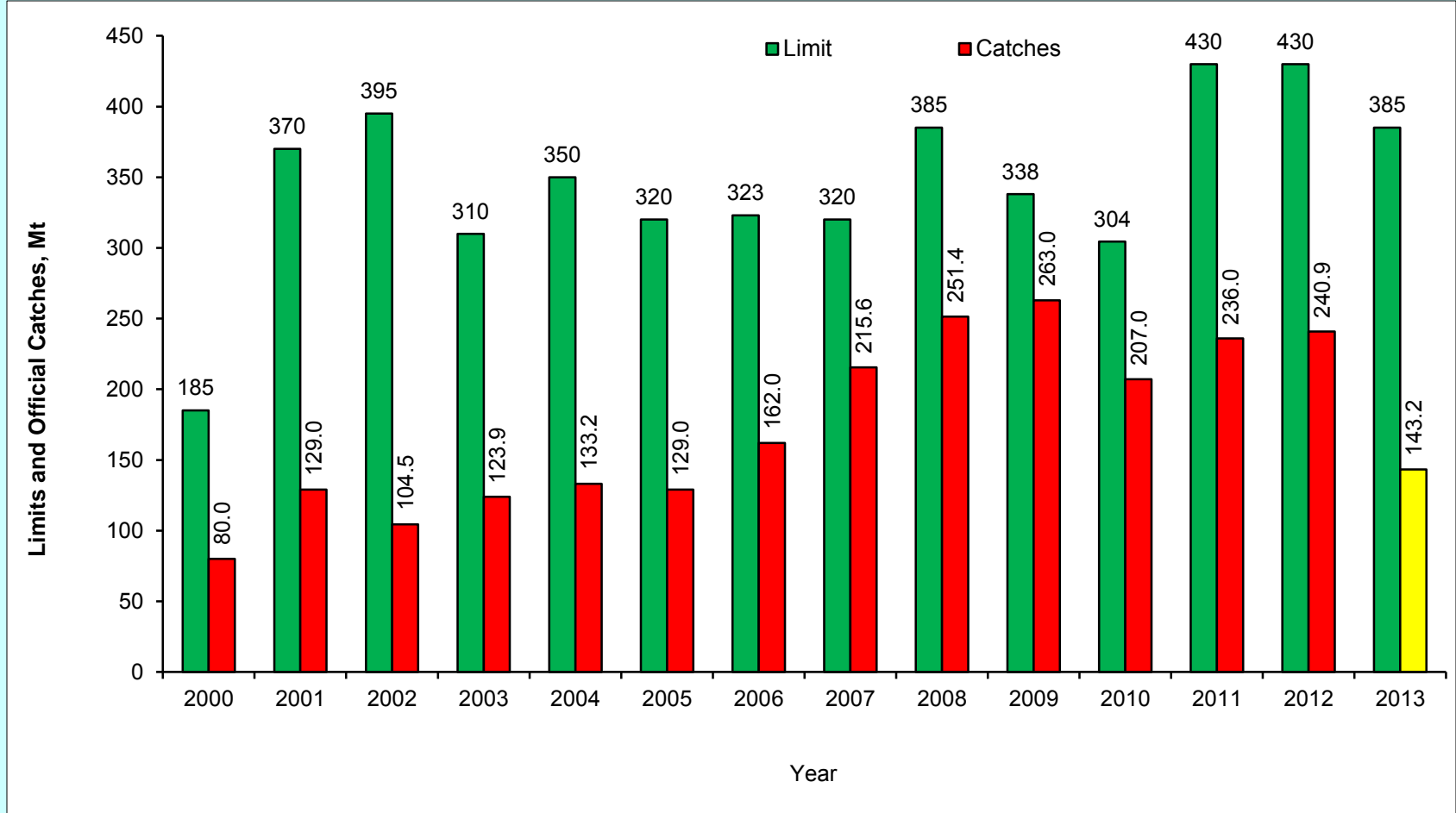


DRIVER: fishery pressure

Notable decline of **Relative Catch** = total number and total weight of specimens per 1000 m of gill-net per fishing day –

since 2010 – result of fishing pressure increase

Catch Limits and Official Landings of turbot in Ukrainian area



DRIVER: fishery pressure (mainly IUU?)

CONCLUSIONS:

- 1) Turbot population off Sevastopol is in depressed state
- 2) Main **specific drivers** related to negative changes off Sevastopol:
 - **overfishing (official and mainly IUU)** - 1998 -2013
 - **collapses in planktonic food chain** -1996 -2001
 - **pollution and contamination of environment** (permanent)
 - **feeding and spawning habitat destruction** (permanent)
- 3) Rehabilitation of turbot stock and habitat is necessary
- 4) Joint cooperated combined assessment of overall Black Sea turbot population proposed to be carried out on the basis of field and experimental research
- 5) Assessment turbot studies should include combined analysis of turbot population, eggs and larvae distribution, phyto- and zooplankton analysis, 0-group field studies

***Thank you for your interest
to our life!***



***Message from the Black Sea
turbot reared in IBSS***