

The evidence suggests that fish in the North East Atlantic are being exposed through either the water or their diet to persistent organic pollutants with oestrogenic activity.

- Strong +ve relationship to fish size in both cod and dab
- Regional differences in dab
- VTG not correlated with age in either species.
- No evidence that VTG elevations caused by intersex or endogenous  $17\beta$ -oestradiol.
- No association with time of year/reproductive cycle
- Striking similarities to the problem in male swordfish and tuna in the Mediterranean



#### Stickleback Intercalibrations (Led by CEFAS)

- Phase 1a intercalibration - 2004
- 21 day design – endpoints measured day 14 and 21
- Non spawning assay
- Test substances -E2 (potent oestrogen) and trenbolone (potent androgen)
- Participants – Cefas (UK), CEH (UK), Bergen University (Norway)
- Results: oestrogen – VTG induction in males; androgen – spiggin induction in females
- Relevant and reproducible endpoints
- Phase 1b intercalibration - 2006
- 21 day design – endpoints measured day 21 only
- Spawning introduced as a QA measure NOT as an ED diagnostic endpoint
- Test substances - 4TPP (weak oestrogen), prochloraz (aromatase inhibitor), flutamide (anti-androgen),  $KMnO_4$  (negative control)
- Participants – Cefas (all substances), CEH (all substances), Wildlife International (USA) (flutamide)
- Studies ongoing; due to be completed in time for OECD meeting January 2007
- Preliminary results (1 lab) – VTG induction in males by 4TPP and inhibition of VTG in females (prochloraz)



<i>EDC</i>	Oestrogens	Androgens	Aromatase inhibitors	Anti androgens
<i>Species</i>				
Japanese medaka	↑ VTG males	↓ VTG females	↓ VTG females	X
Fathead minnow	↑ VTG males	↓ VTG females	↓ VTG females	X
zebrafish	↑ VTG males	↓ VTG females	↓ VTG females	X
Stickleback	↑ VTG males	↓ VTG females ↑ Spiggin females	↓ VTG females	↓ spiggin males



**Stickleback Courtship During Exposure – Fenitrothion control**

SC= 70% of the males, FN-1= 40%, FN-50= 10%, FN-200= 0%

