

# **Emerging Contaminants in Southern California**

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**[www.sccwrp.org](http://www.sccwrp.org)**

# Emerging Contaminants Come In Many Flavors

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- **Endocrine disrupting compounds**
  - Interferes with production, distribution or function of hormones
- **Synthetic industrial products or byproducts**
- **New pesticides**
  - legacy pesticides inducing previously unreported effects

# Examples of Endocrine Disrupting Compounds

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- **Pharmaceuticals**
- **Synthetic or naturally occurring hormones**
- **Plasticizers**
- **Personal care products**
- **Pesticides**
- **Fire retardants**

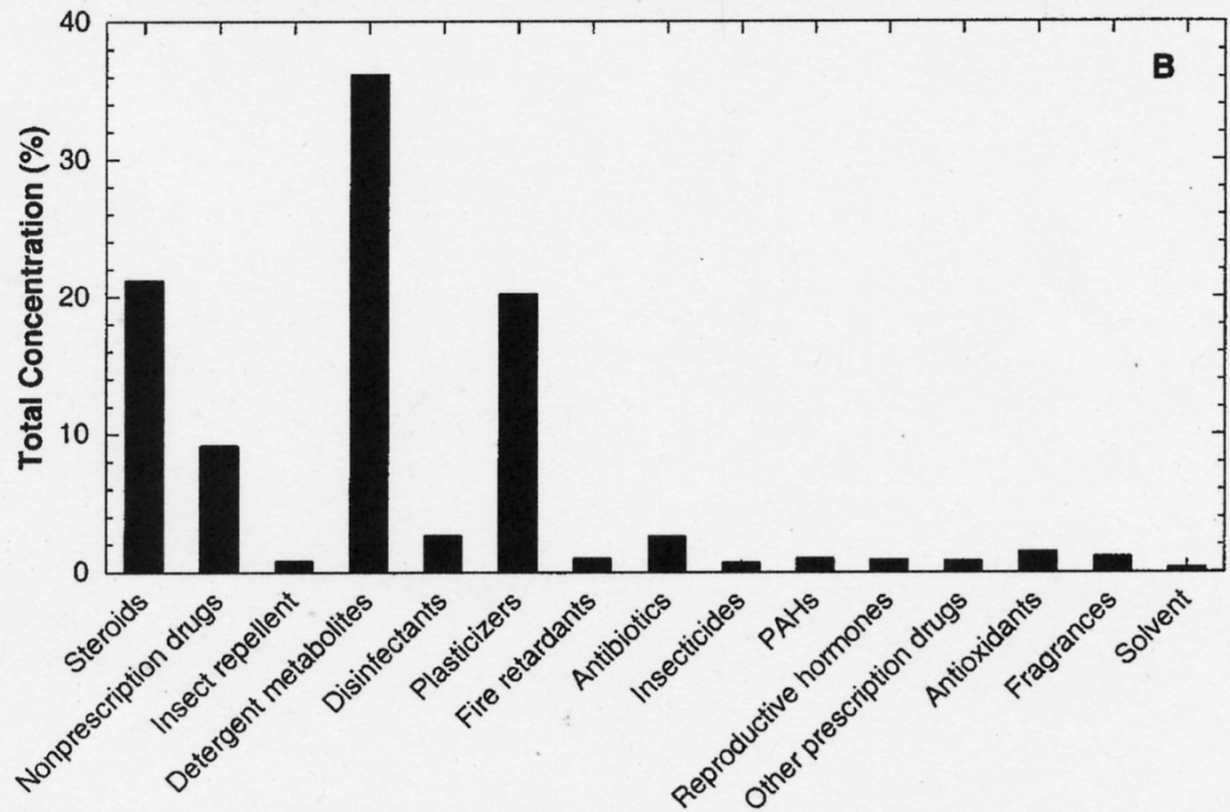
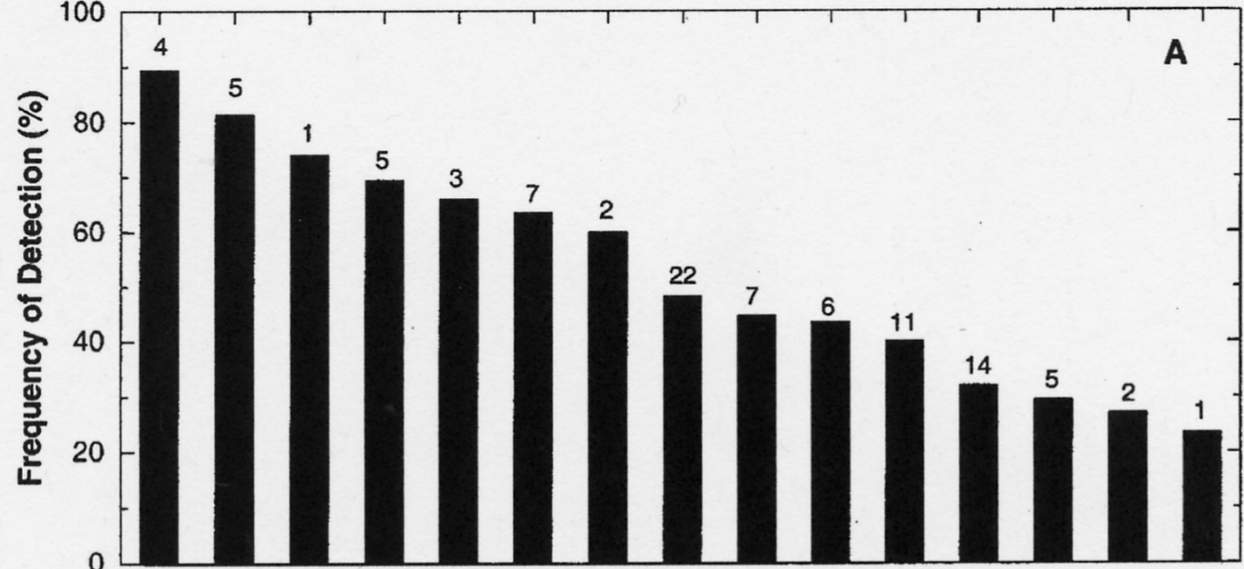
# Can EDCs Be a Problem In Southern California?

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- **Other investigators have observed EDCs in their systems**
  - measured endocrine disruption effects
- **Southern California has a large potential for EDC discharges**
  - Greater than 1,000 MGD treated effluent to the ocean
- **Effects in marine organisms have rarely been the focus of previous studies**

# National Stream Survey

Kolpin, *et al.* 2002



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# Wastewater Fate of Emerging Contaminants In Secondary Treatment

Compound	Use
<b>Good Removal</b>	
Ibuprofen	Pharmaceutical
oxybenzone	Sunscreen
chloroxylenol	Germicide
butylbenzyl phthalate	Plasticizer
<b>Moderate Removal</b>	
octylphenol	Surfactant
Triclosan	Antibacterial
benzophenone	Fragrance
<b>Poor Removal</b>	
Tri(chloroethyl) Phosphate (TCEP)	Flame Retardant
BHA	Antioxidant
DEET	Insecticide
Musk ketone	Fragrance
Galaxolide	Fragrance

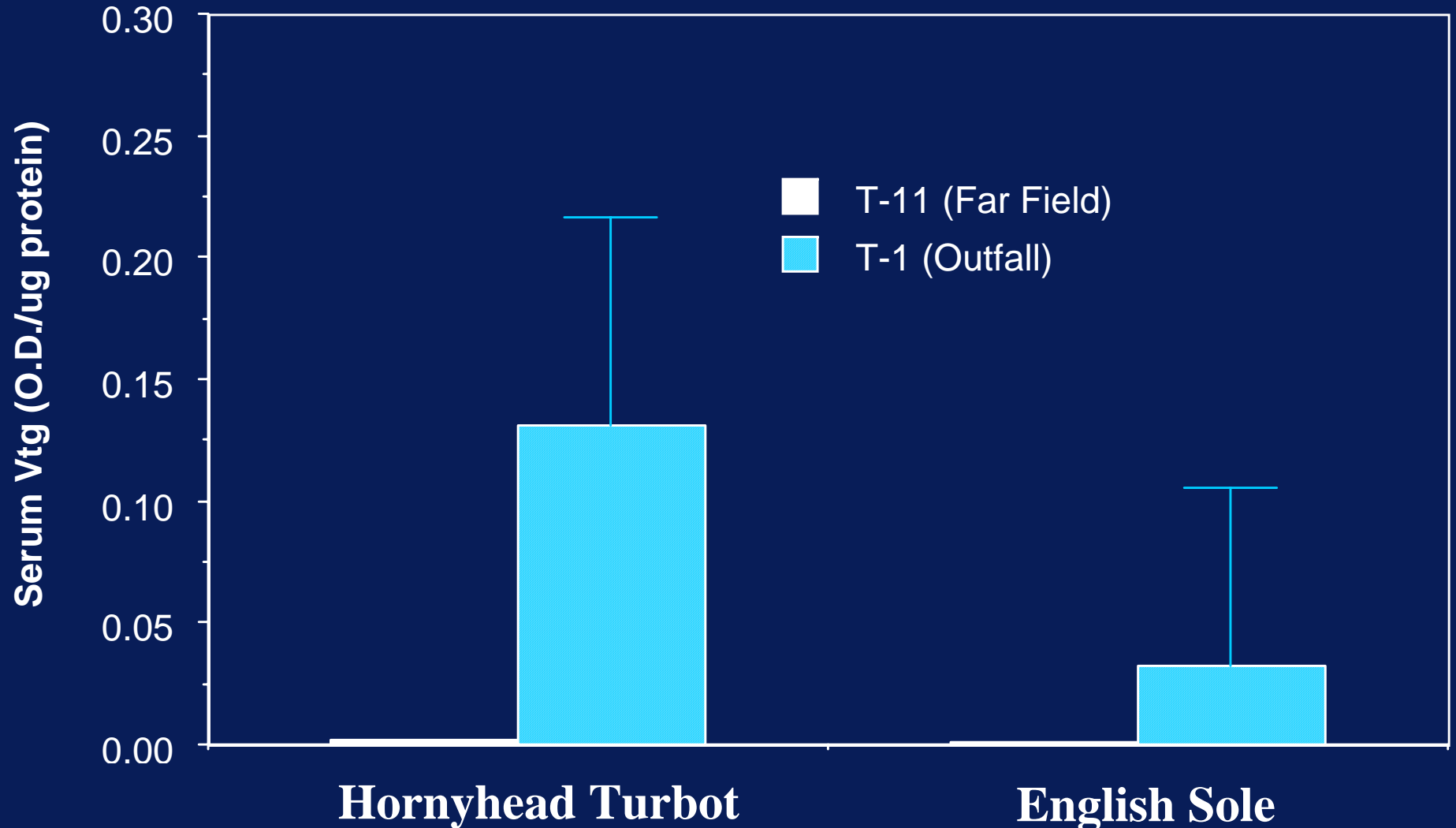
# What Do We Know?

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- **Endocrine disruption has been measured in coastal fish**
  - **Varies by species**
- **Hint of relationships with potential sources**
  - **Effects at population level were not evident**
- **Evidence of “feminization” in male fish**
  - **“testis-ova” in approximately 10% of fish examined**



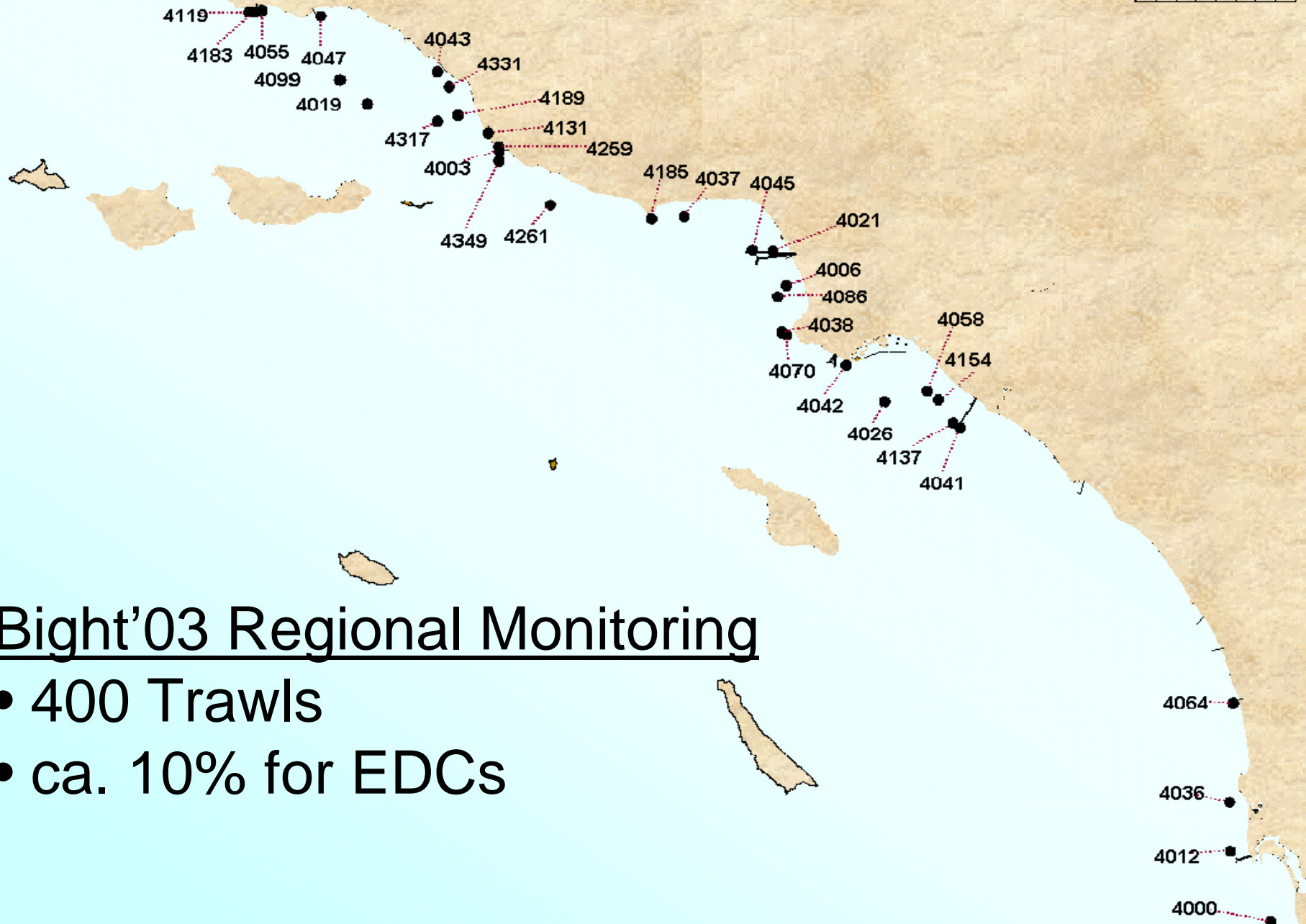
# Vitellogenin in Male Flatfish from Outfall and Nonoutfall Areas January 2003



# Hornyhead Turbot Population Data

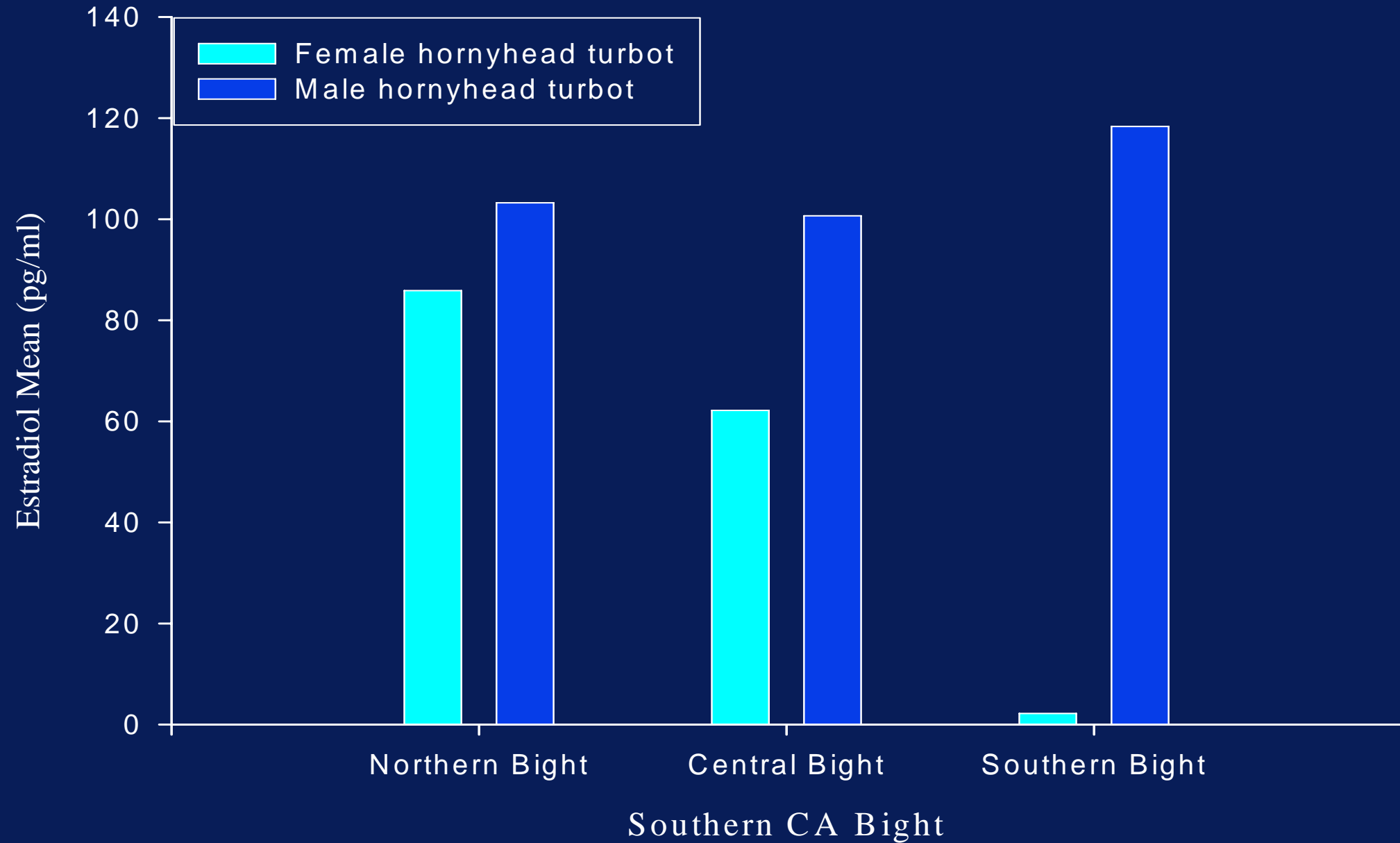
<b>Area</b>	<b>% Males</b>	<b>% Sexually Mature at Age</b>
<b>Outfall</b>	<b>63%</b>	<b>100%</b>
<b>Far Field</b>	<b>63%</b>	<b>98%</b>

0 3 6 12 18 24  
Kilometers

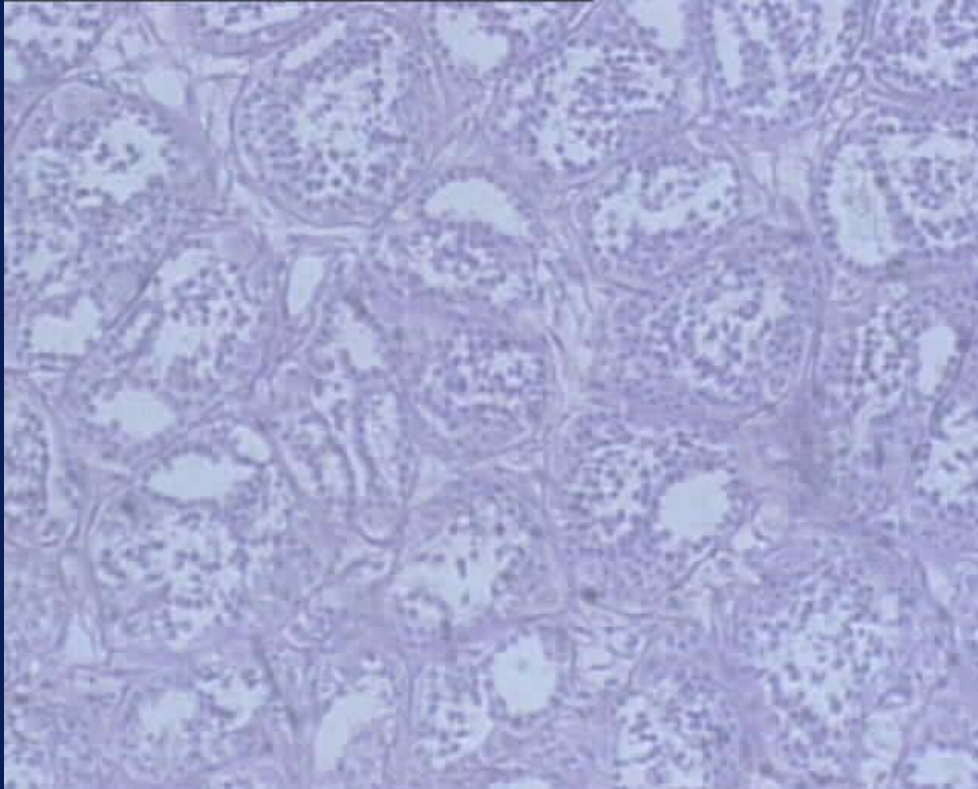


## Bight'03 Regional Monitoring

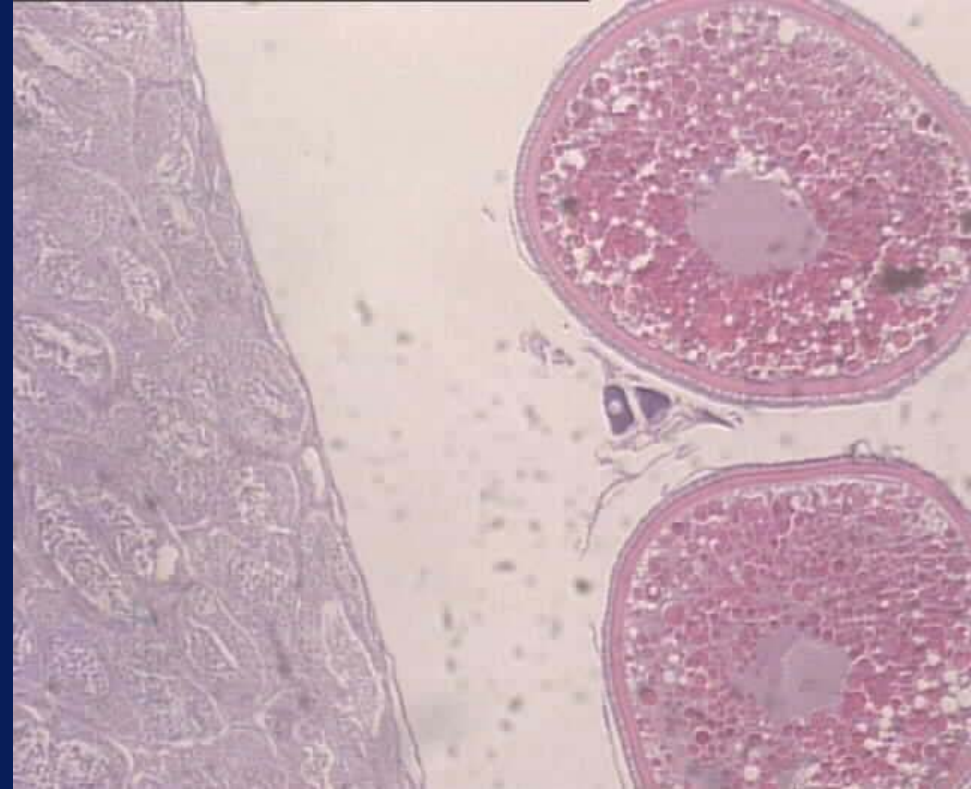
- 400 Trawls
- ca. 10% for EDCs



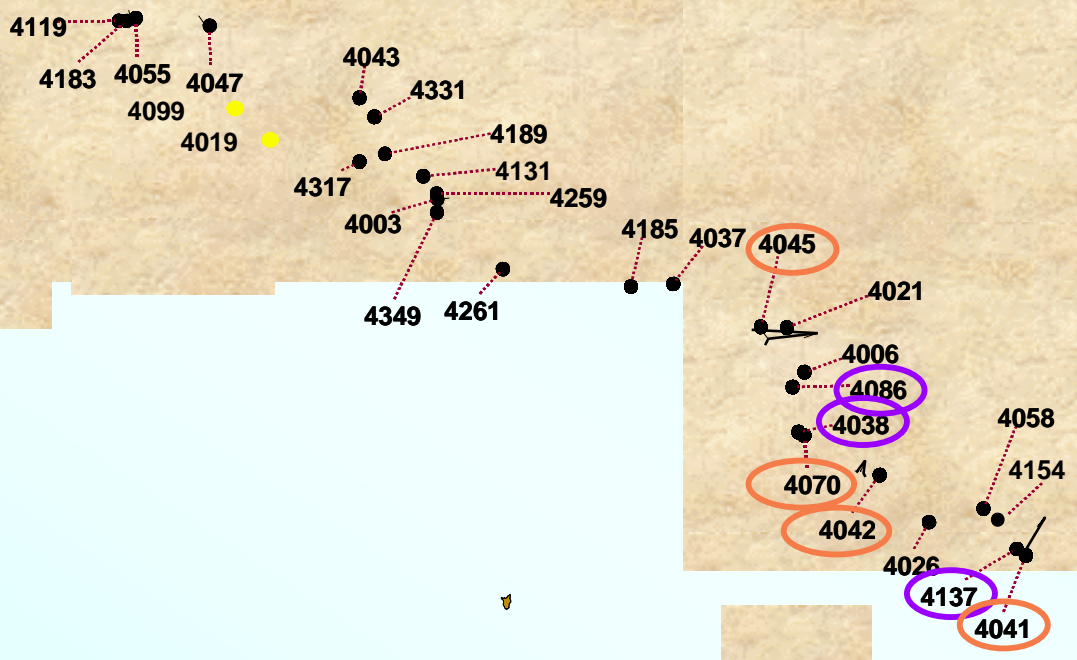
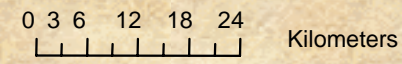
# Gonad Histopathological Sections





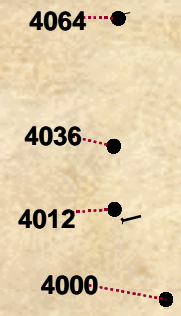
**Normal male Hornyhead turbot**



**Abnormal male Hornyhead turbot**



-  English sole
-  Hornyhead turbot



# What Don't We Know?

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- **What are endocrine cycles in reference areas?**
  - Are the cycles different in outfall areas?
- **Is the presence of endocrine disruption associated with biological effects?**
  - Cellular, Individual, community, or population levels?
- **What are the specific EDCs responsible for effects?**
  - Can we identify the source(s) of the EDC(s)?

# Addressing The Needs

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- **Strong research collaborative**
  - Three State Universities
  - Four POTWs
  - One NGO
  - SWRCB
- **Three year project**
  - multi-faceted design
- **Report out to the SCCWRP Commission**



# Partnership Progress To Date

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- **Developed new measurement tools**
  - gene microarray, ELISA kits, etc.
- **More than 600 fish collected at approximately 40 sites bightwide**
- **More than 35 effluent, water column and sediment measurements**
- **Preparing for laboratory exposures in Summer 2007**
- **Results expected 2008**