Embryo Toxicity

what we learned in the past, and the significance to the future

Or

Reflections on 40 years of oil toxicity research

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Reflections on 40 years of oil toxicity research

First Job:
TAPS EIS

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TAPS EIS = Risk Assessment

Pre-spill questions-

How sensitive are the local species?

What about the early life stages?

How will happen to the ecosystem?

Oh by the way, Not much $$$ to invest in the pre-spill questions

Pre-spill questions-

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How will happen to the ecosystem?

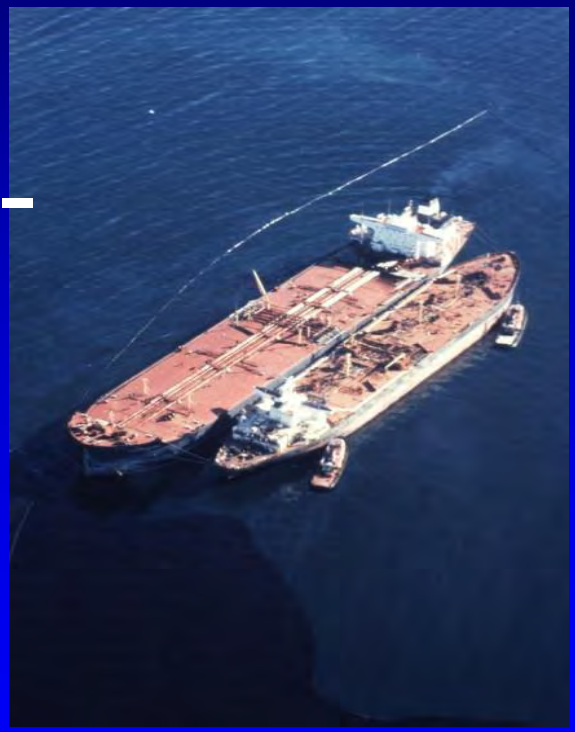
Fast Forward > > >Exxon Valdez

Same Pre-spill Questions-

How sensitive are the local species?

What about the early life stages?

How will happen to the ecosystem?



Oh by the way - we have $$$

Same Pre-spill Questions-

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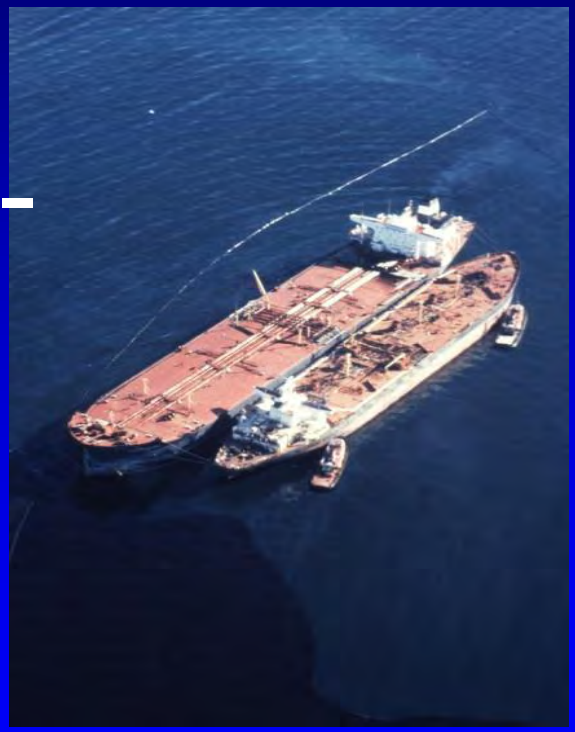
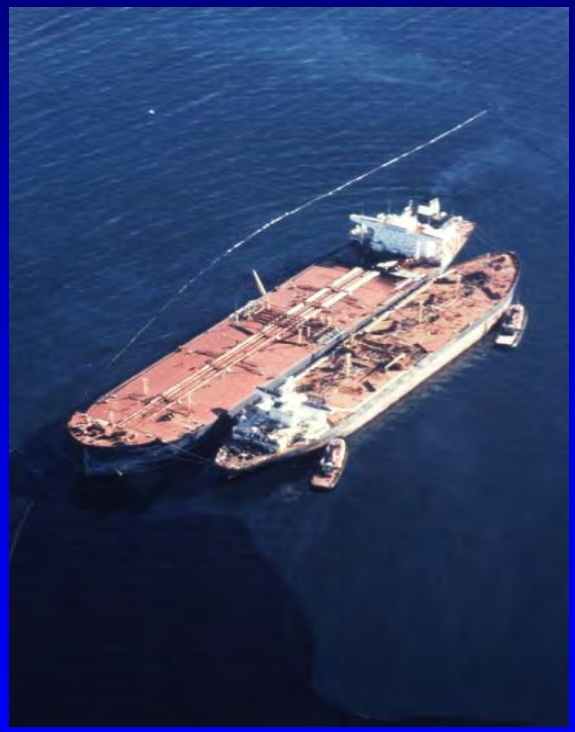


First lesson:

lack of pre-spill info hurts



Best Studies had

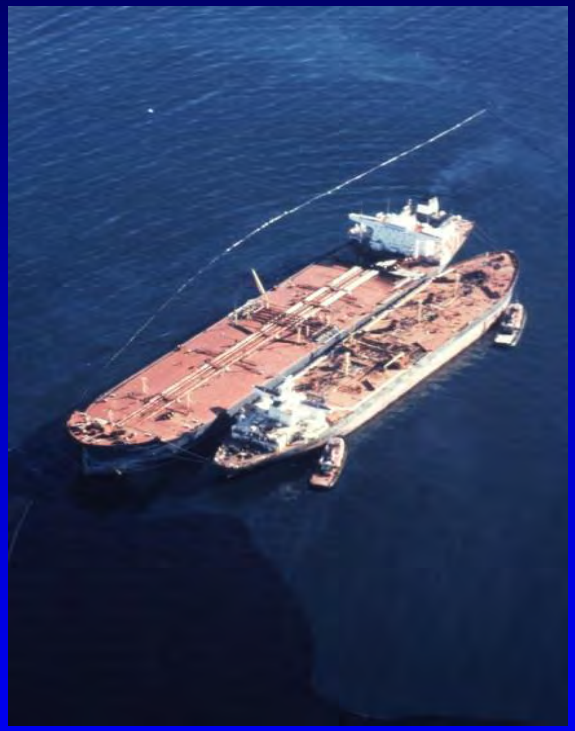
Pre-spill Population info

commercial species

Species of un-common interest

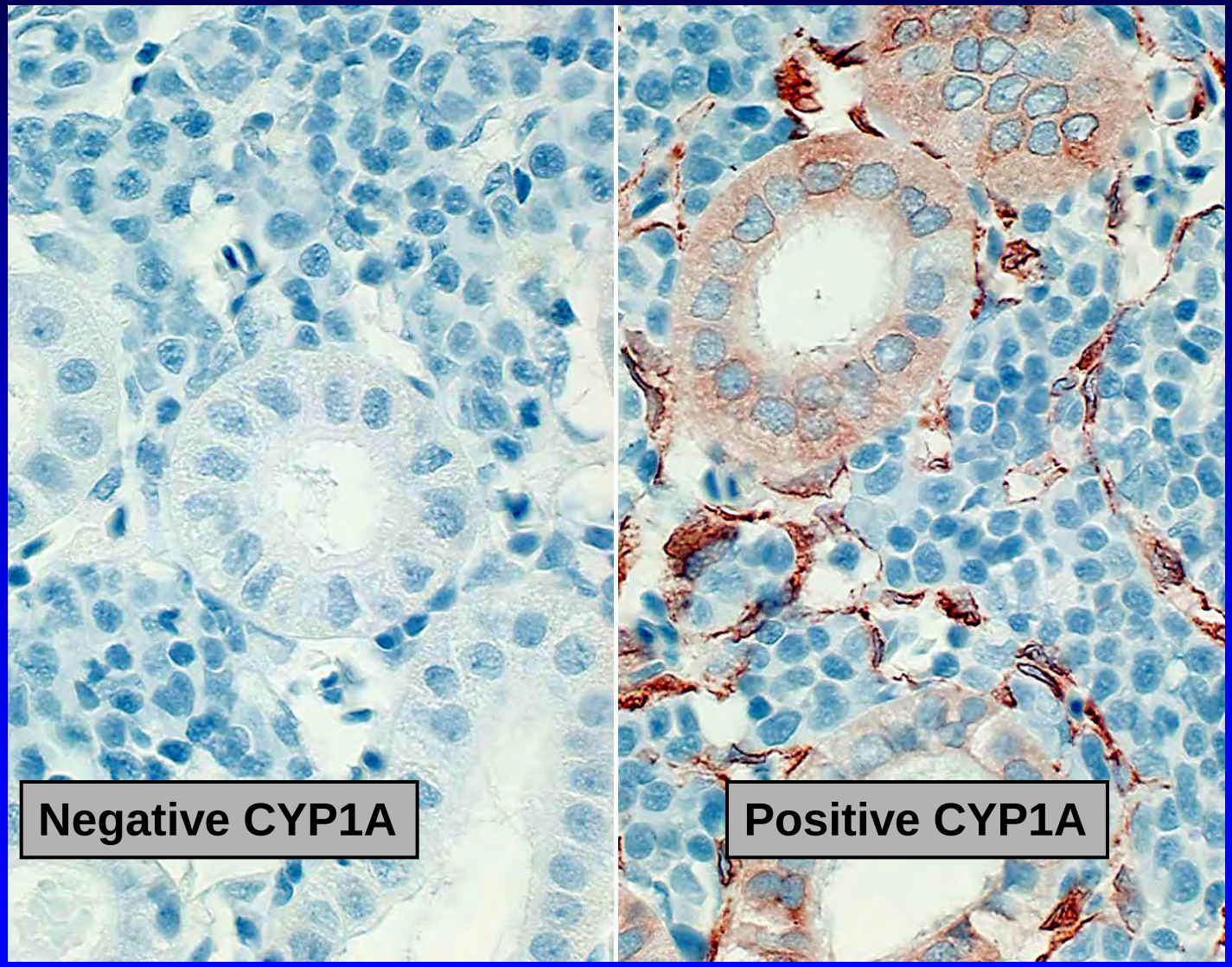
Second lesson:

Lab studies were not all that helpful



Tough to relate an acute LC 50 to relevant environmental situation

e.g. 1989, Pink Salmon embryos in the wild elevated P450, What did it mean?



Pink Salmon study- Paradigm changes

ADFG found elevated embryo mortalities in oiled streams

ABL Lab studies used Environmentally relevant doses

-Effects at **PPB** concentrations

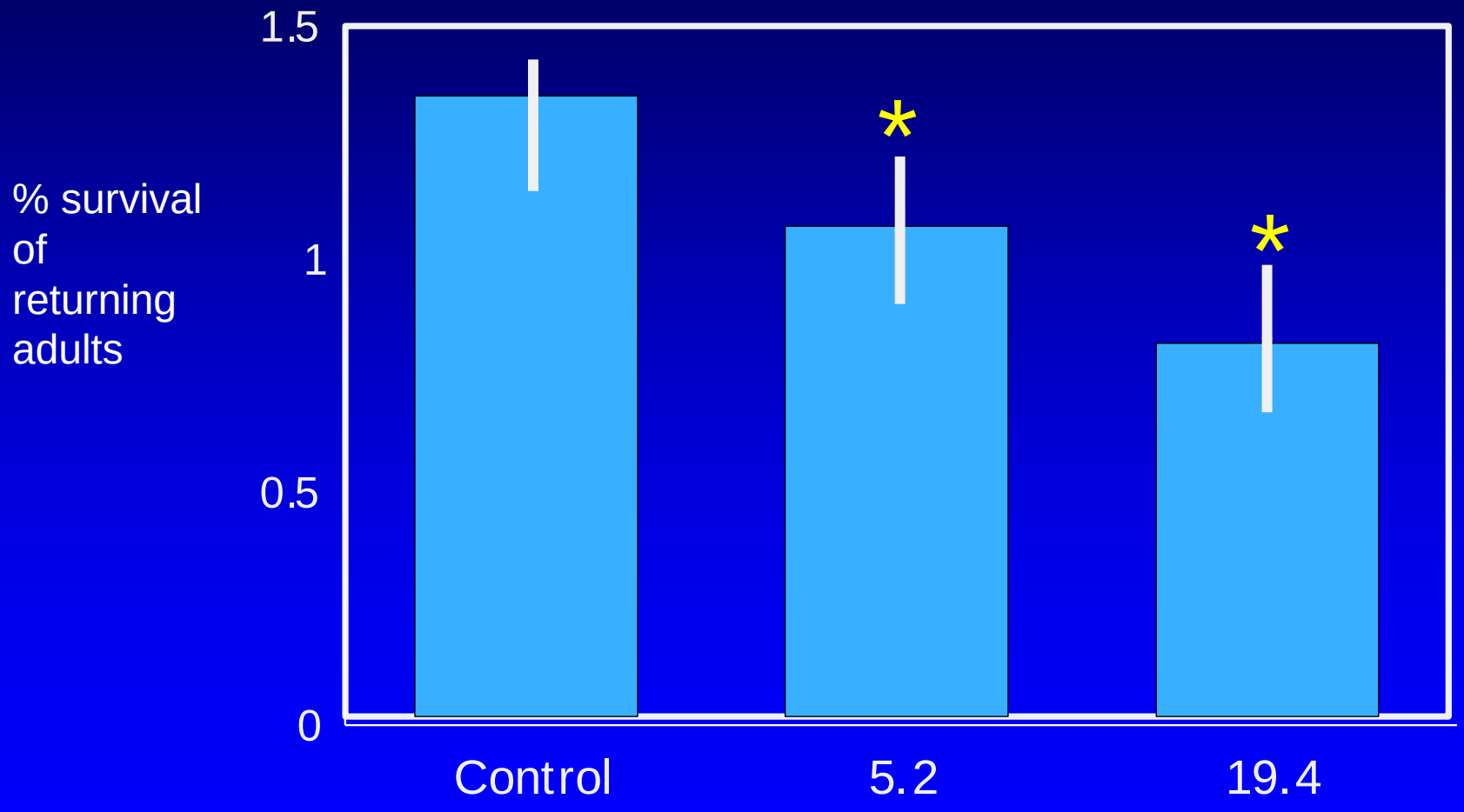
-Long term exposures **(Months)**

-Delayed effects

Delayed Growth:

Effects on Adult Salmon Returns

Lab Research



Fast Forward > > > another decade

Cosco Busan, DWH

Same Pre-spill Questions-

How sensitive are the local species?

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Fast Forward > > > another decade

Cosco Busan, DWH

Same Pre-spill Questions-

Tools are getting better

Toxicity mechanism has shifted

Narcosis >>to embryo toxicity

John Incardona, Peter Hodson labs have produced

What tools do we need?

1.Tools to predict impacts

2.Tools to measure impacts

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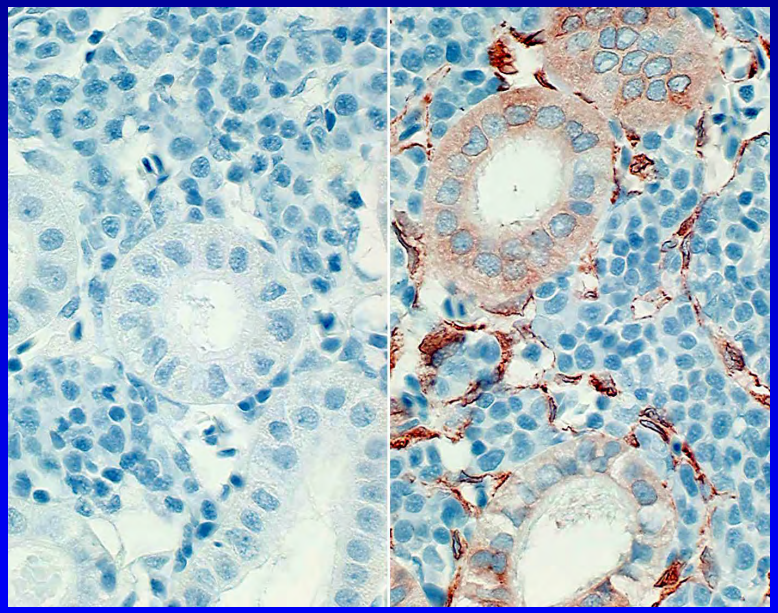
Baselines

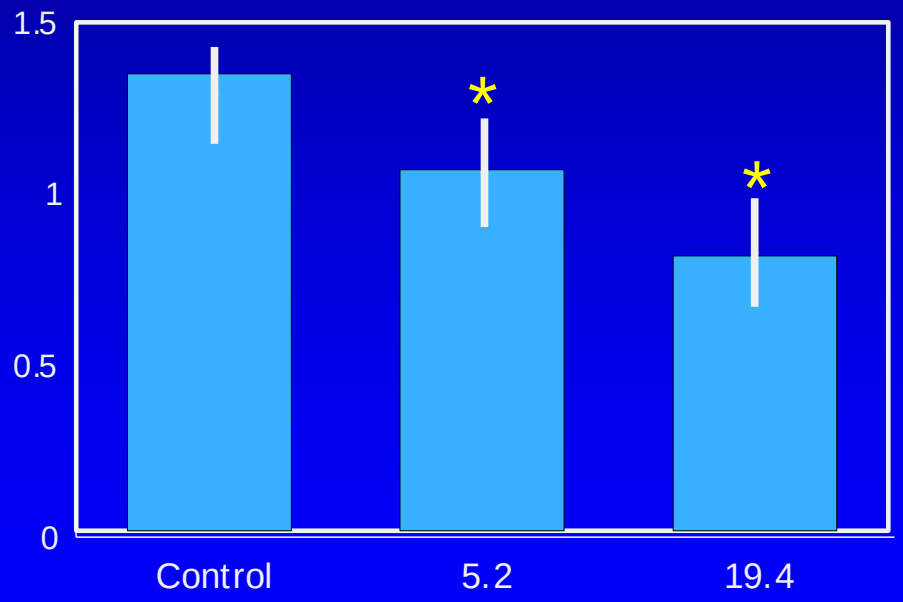
1.Population (Pre/ Post)

2.Biochemical/biological (Pre/ Post)

Back to the P450 example

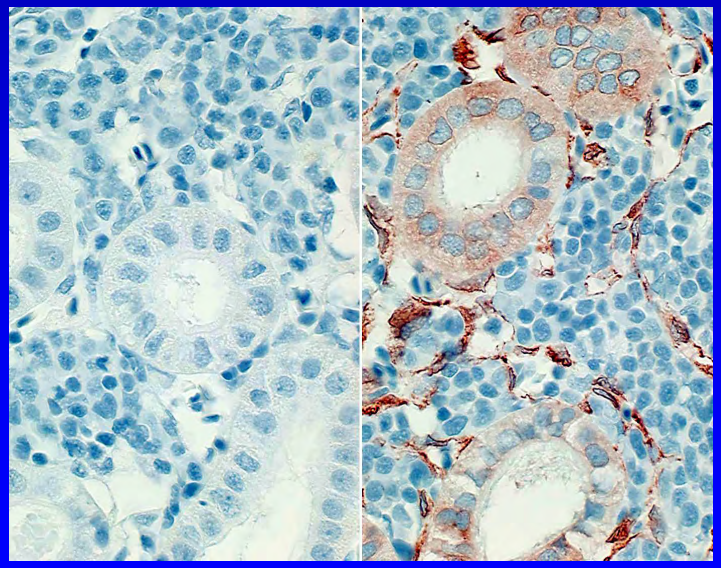
P450 was elevated in embryos, and predicts poor adult returns

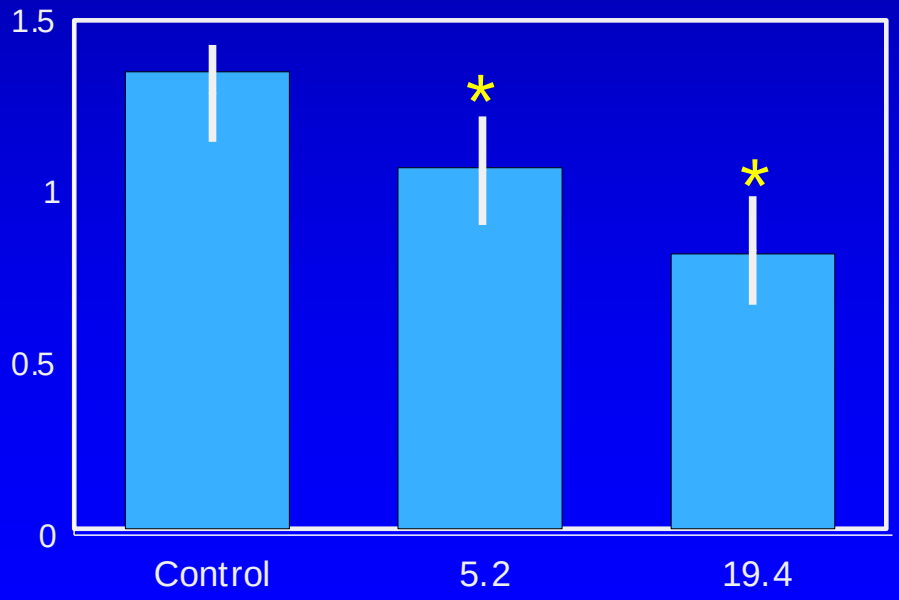




Back to the P450 example

BUT---This prediction does not work if you sample a later stage (Juvenile)- So we need biomarkers that last through time





What tools do we need?

We need to sample

1. **assess whether exposed or not**
2. **Predict long term survivability**

Biomarkers that persist through time

e.g. gene expression