

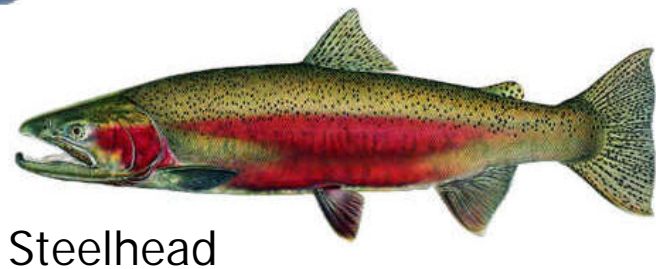
# Washington State Surface Water Monitoring for Pesticides in Salmonid Bearing Streams



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Illustrations - USFS



# Marion Drain



# What do we find?

## ➤ 81% Herbicides

- Terbacil (Sinbar)
- Atrazine (Aatrex)
- 2,4-D
- Bentazon (Basagran)
- Diuron (Karmex)
- Pendimethalin (Prowl)
- Trifluralin (Treflan)

## ➤ 19% Insecticides

- Chlorpyrifos (Dursban)
- Malathion
- Ethoprop (Mocap)
- Dimethoate
- Carbaryl (Sevin)
- Propargite (Omite)
- Azinphos-methyl (Guthion)

**<1% degradate compounds**

**Average of 5 pesticide residues in each sample**

# Fisheries detection profile

General Life Cycle of Yakima Basin Summer Steelhead (Haring, 2001)

Life Stage	March	April	May	June	July	August	September	October
Spawning Run								
Winter Holding								
Spawning								
Incubation								
Emergence								
Fry Colonization								
0+ Summer R.								

Maximum (Risk) Residue Detections of the Marion Drain

Year	Freq.	March	April	May	June	July	August	September	October
2003	10%								
2004	17%								
2005	15%								
2006	6%								

Chlorpyrifos Residue Detections of the Marion Drain

Year	Freq.	March	April	May	June	July	August	September	October
2003	43%								
2004	37%								
2005	24%								
2006	65%								

Each square represents the period when a sample was taken. If blank, then no insecticide detected.

No samples taken during this period.

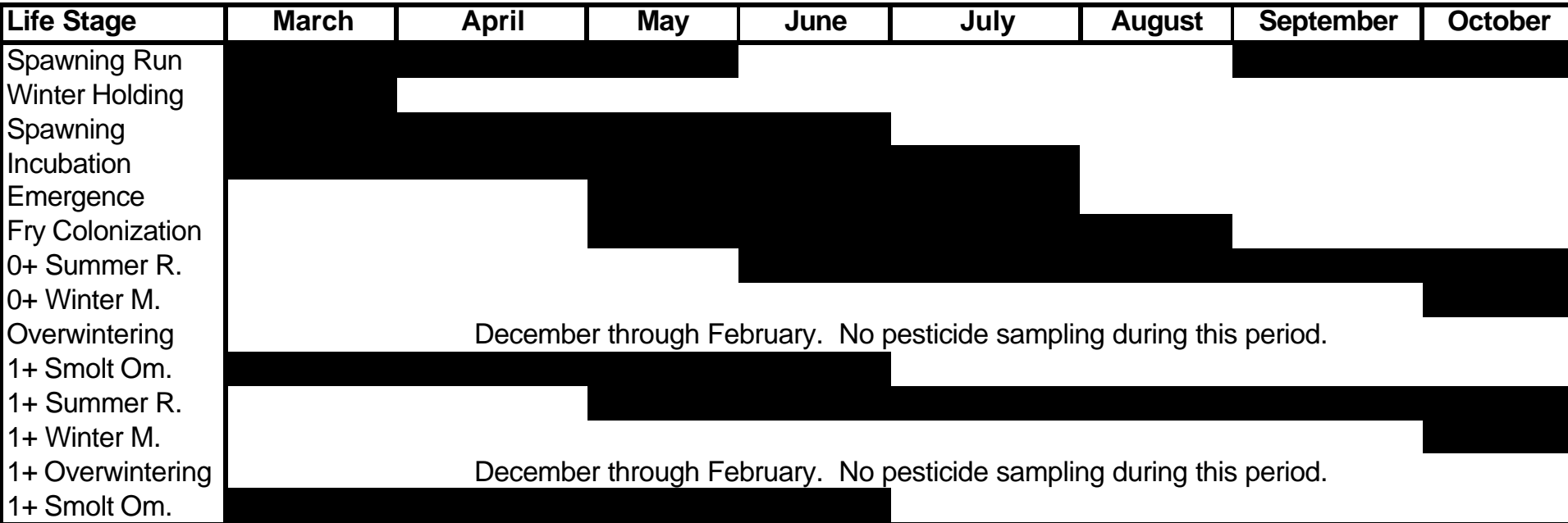
Detection of insecticide residue, concentration below toxicological endpoint.

Magnitude of detection above chronic (NOEC) or acute (LC50) invertebrate endpoint.

Magnitude of detection above Endangered Species Level of Concern for fish (1/20th of LC50).

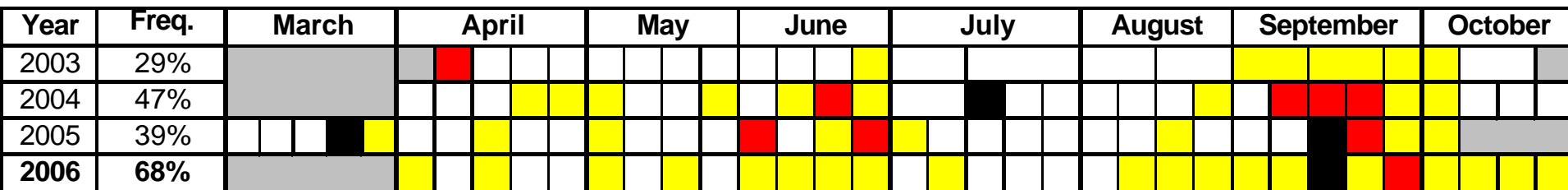
# Invertebrate detection profile

General Life Cycle of Yakima Basin Summer Steelhead (Haring, 2001)



R Rearing  
M Migration  
Om Outmigration

Invertebrate Detection Evaluation of the Marion Drain



Each square represents the period when a sample was taken.

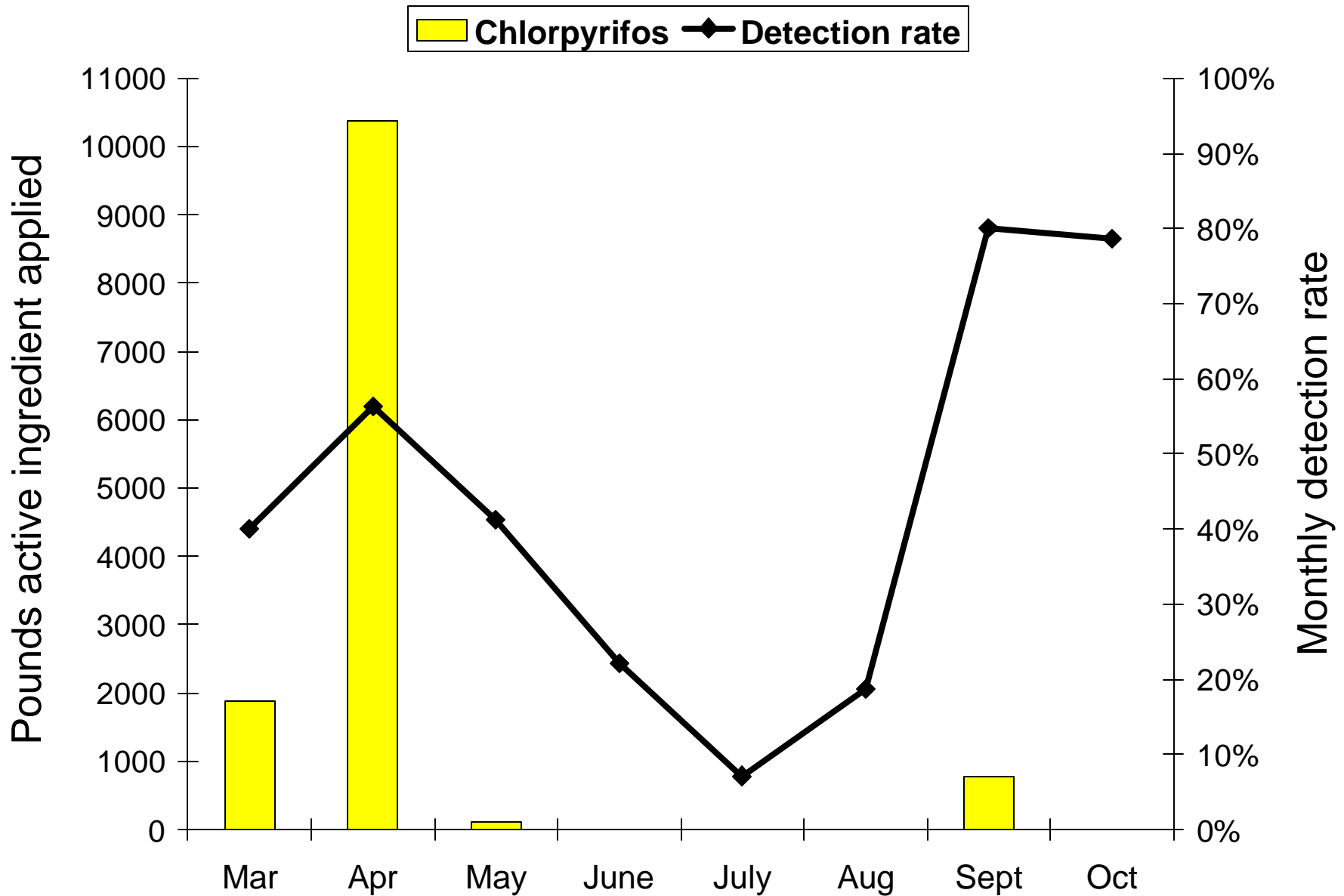
[Grey] No samples taken during this period.

[Yellow] Magnitude of detection above 1/10th of chronic invertebrate endpoint (NOEC).

[Red] Magnitude of detection above chronic invertebrate endpoint (NOEC).

[Black] Magnitude of detection above acute invertebrate endpoint (LC50).

# Application rate and detection timing



# Thornton Creek





# Thornton Creek Detection Profile

## ➤ 80% Herbicides

- Dichlobenil (Casoron)
- Triclopyr
- MCPP (Mecoprop)
- 2,4-D (Prowl)
- Diuron (Karmex)
- Prometon (Pramitol)
- Trifluralin (Treflan)

## ➤ 10% Wood Preservative

- Pentachlorophenol (Penta)

## ➤ 9% Insecticides

- Diazinon
- Carbaryl (Sevin)

**<1% degradate compounds**

**Average of 3 pesticide residues in each sample**

# Fish and invertebrate detection profile

## General Life Cycle of Thornton Creek Fall Chinook

Life Stage	March	April	May	June	July	August	September	October
Spawning Run								
Spawning								
Incubation	■	■						
Emergence	■	■	■					
Fry Colonization	■	■	■	■				
0+ Summer R.	■	■	■	■	■			
Juvenile Om.	■	■	■	■	■	■		

R Rearing

Om Outmigration

## Residue Detection Evaluation

Year	Freq.	March	April	May	June	July	August	September	October
2003	38%	■	■	■	■	■	■	■	■
2004	6%		■	■					
2005	6%			■	■				■
2006	8%	■	■						■

Magnitude of detection above 1/10th of chronic invertebrate endpoint (NOEC).

## Diazinon Residue Detections of Thornton Creek

Year	Freq.	March	April	May	June	July	August	September	October
2003	46%	■	■	■	■	■	■	■	■
2004	16%		■	■	■	■			
2005	3%			■					■
2006	8%	■	■						■

Each square represents the period when a sample was taken. If blank, then chlorpyrifos was not detected.

No samples taken during this period.

Detection of insecticide residue, concentration below assessment endpoints.

Magnitude of detection above 1/10th of chronic invertebrate endpoint (NOEC).

Magnitude of detection above chronic invertebrate endpoint (NOEC).

Magnitude of detection above acute invertebrate endpoint (LC50).



# Conclusions

- Pesticide residues present March-October in all watersheds. Complex mixtures predominate.
- Organophosphorus insecticides may exert stress directly to fish and indirectly through food supply reduction or modification in the Marion Drain.
- Diazinon, malathion and chlorpyrifos presence is reduced in response to urban use restriction and registration cancellations (1996-2006).

# Recommendations

## ➤ Surface Water

- Determine pulsing dynamic
- Agricultural metals
- Entire spectrum of habitat envelope

## ➤ Sediment

## ➤ Exposure – bioassay and passive sampling

## ➤ Data assessment

- Complex mixtures
- Sublethal effects
- Pulsed exposure recovery of organisms

# Contact information

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