



Freedom To Create. Spirit To Achieve.

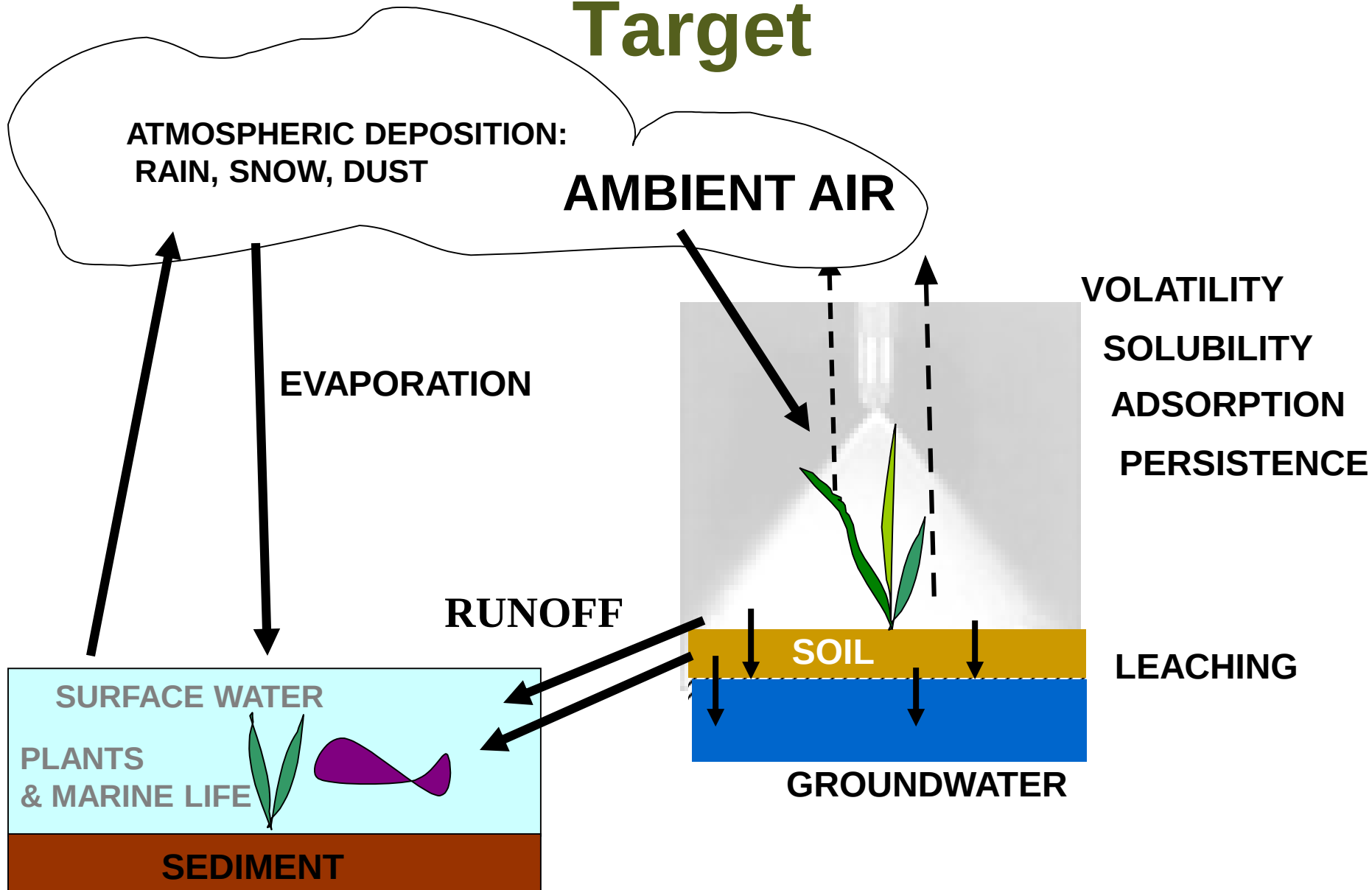
Alberta Environment and Parks

Environmental Monitoring

January 2018

Government
of Alberta ■

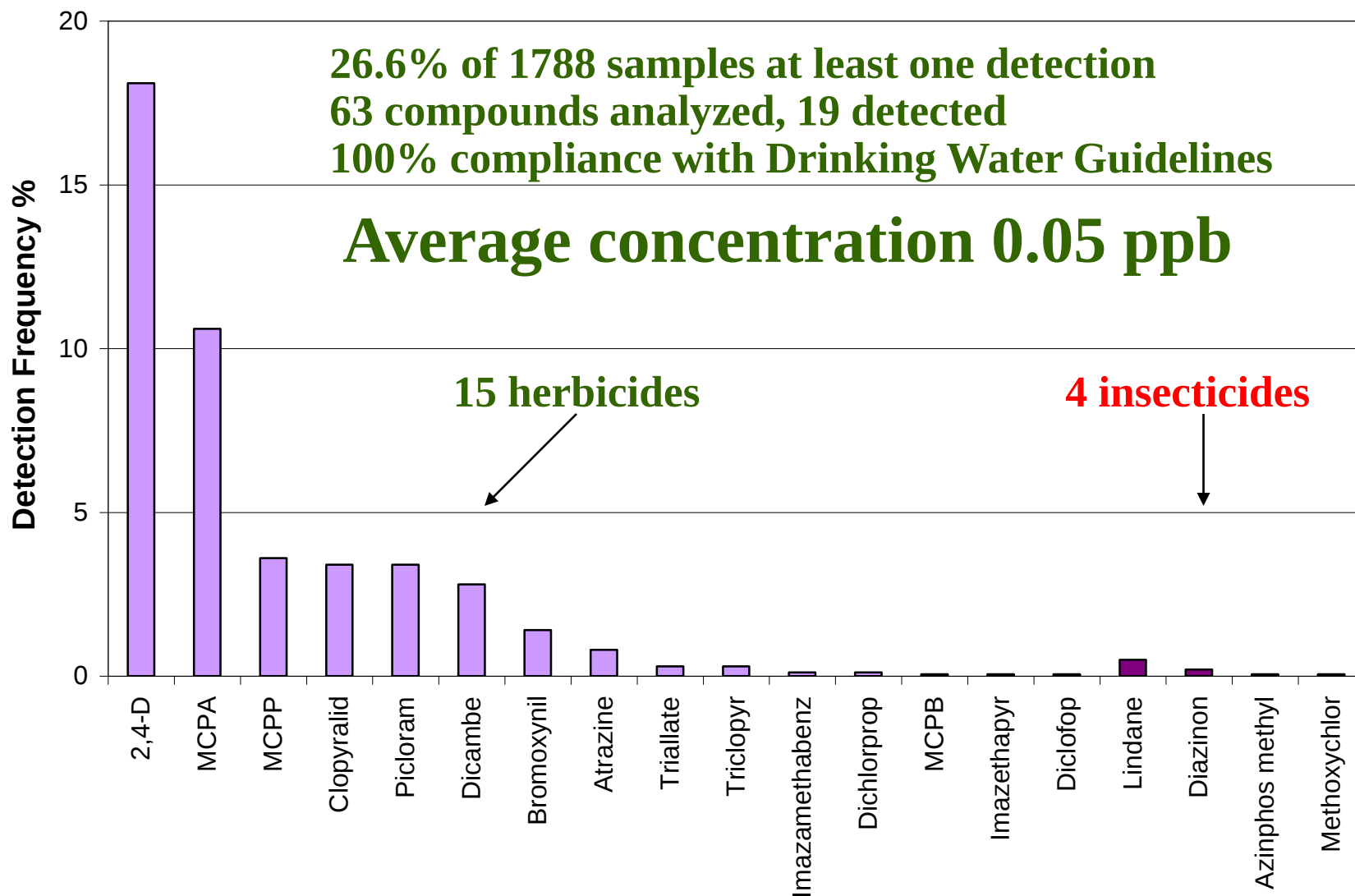
Pesticides Move from Intended Target



AB Environment and Parks Environmental Monitoring

- AEP monitors pesticides in:
 - Treated water
 - Surface water
- Pesticide Guidelines in place for drinking water, freshwater aquatic life, livestock, irrigation, and recreation

Pesticides in Treated Drinking Water 1995 - 2003

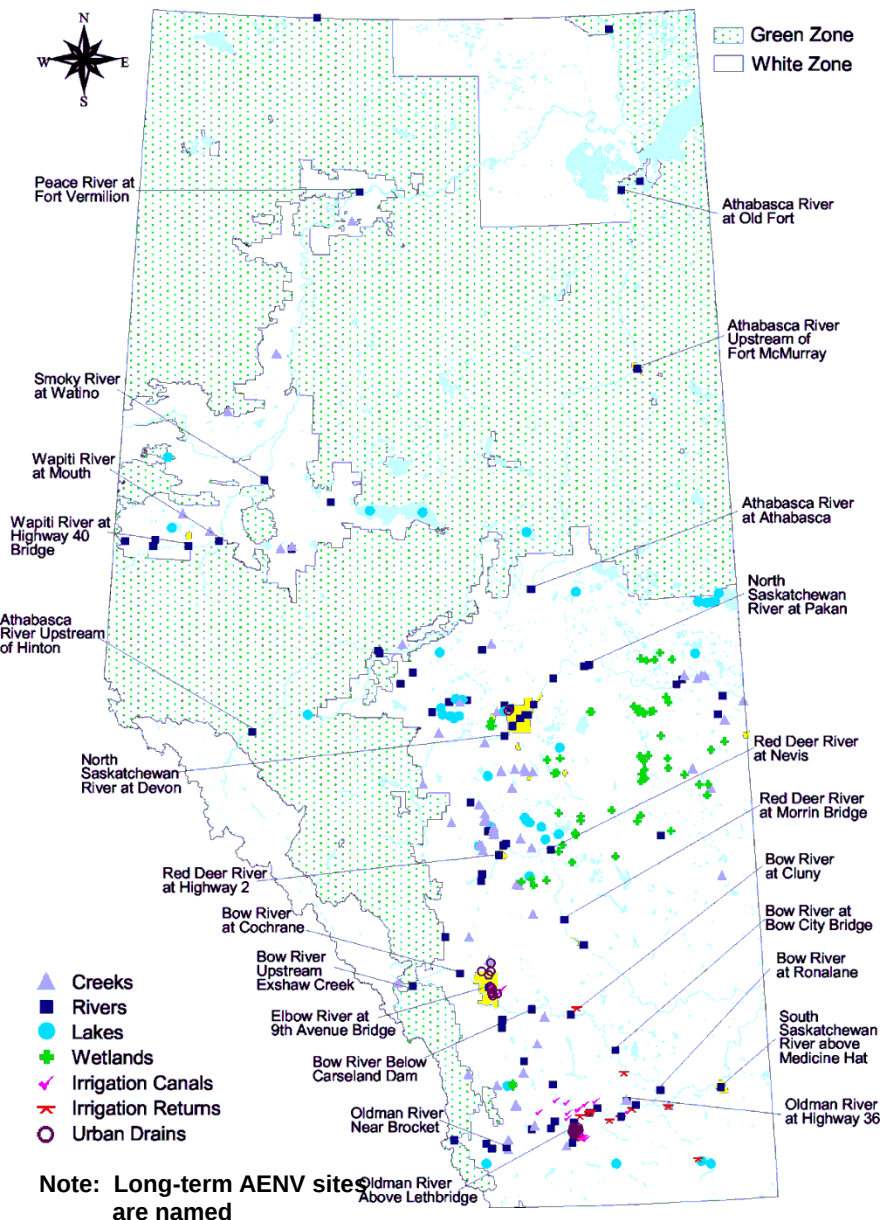


Treated Water Survey General Provisions



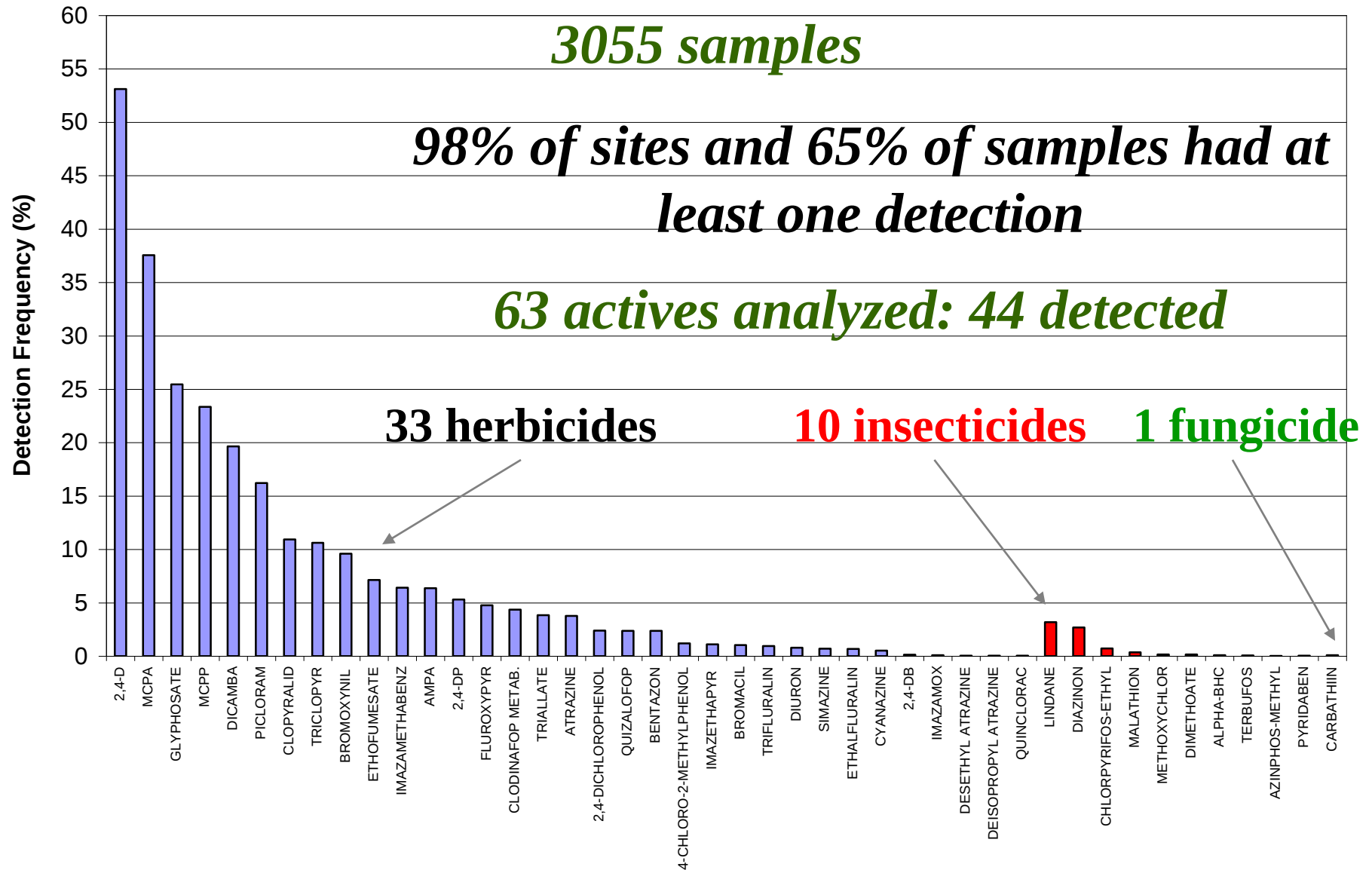
- Pesticides are detected year round
- Water treatment does not effectively reduce pesticide concentrations
- Differences in water basins related to usage patterns and intensity
- All detection levels in compliance with CDWG

Surface Water Monitoring Program 1995-2002



- Most sites in White Zone (urban/agricultural areas)
 - 36 projects
 - 326 sites
 - 3055 samples
- Wide range in study designs involving lakes, creeks, wetlands, rivers, irrigation, urban drains

Pesticides Detected in Surface Waters 1995-2002

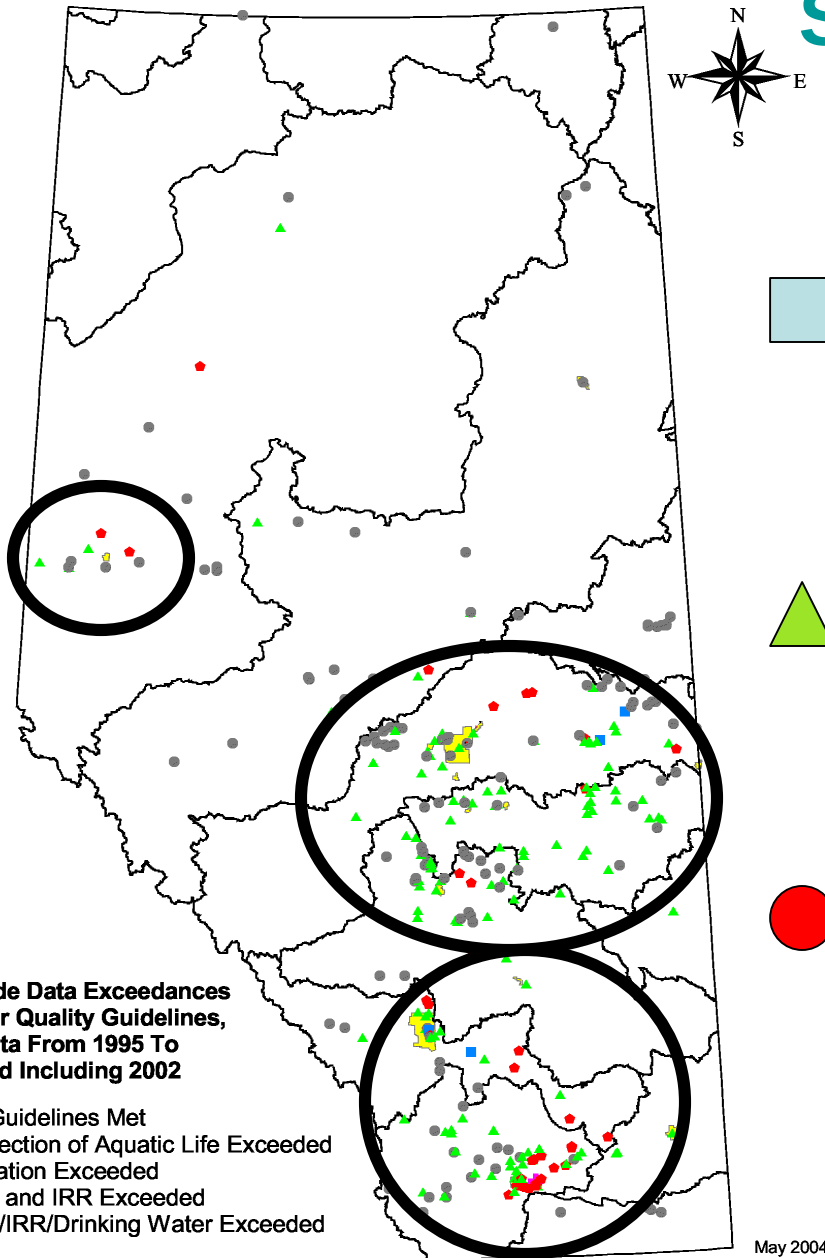


Surface Water Monitoring: Compliance with CCME Guidelines

- • 3.5% samples exceed PAL
(*2,4-D, atrazine, dicamba, MCPA, triallate, chlorpyrifos and lindane*)
- ▲ • 27% samples exceed
Irrigation Guidelines
(*bromacil, bromoxynil, dicamba, and MCPA*)
- • PAL & IRR exceeded
- 0% samples exceed
Livestock

Pesticide Data Exceedances
of Water Quality Guidelines,
Data From 1995 To
And Including 2002

- All Guidelines Met
- Protection of Aquatic Life Exceeded
- ▲ Irrigation Exceeded
- PAL and IRR Exceeded
- ✚ PAL/IRR/Drinking Water Exceeded



*Guidelines not always available
and apply to single compounds
(no cumulative effects included)*

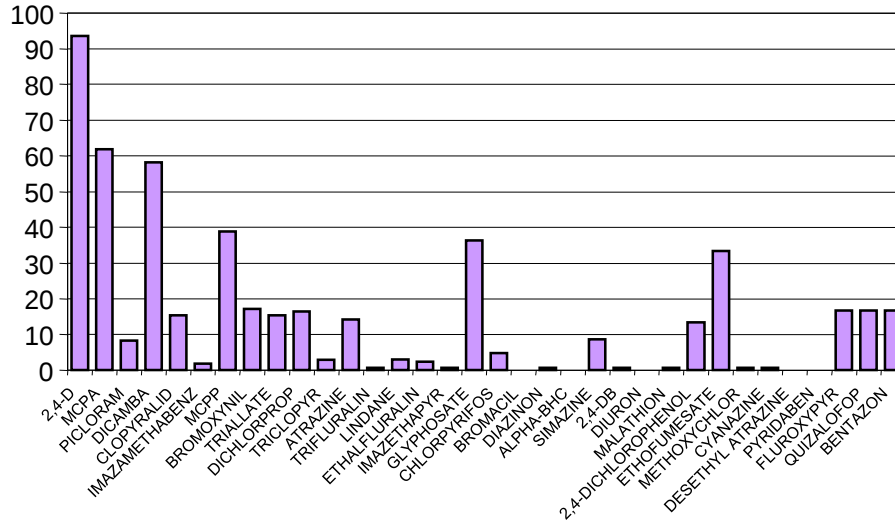
Surface Water Survey

- Highest concentrations in March to Sep, peak June/July
- detection frequency, concentration & number detected per sample highest in:
 - irrigation returns
 - downstream of major urban centres (2,4-D, DIC, MCPPE).
- runoff and rain contribute to load.

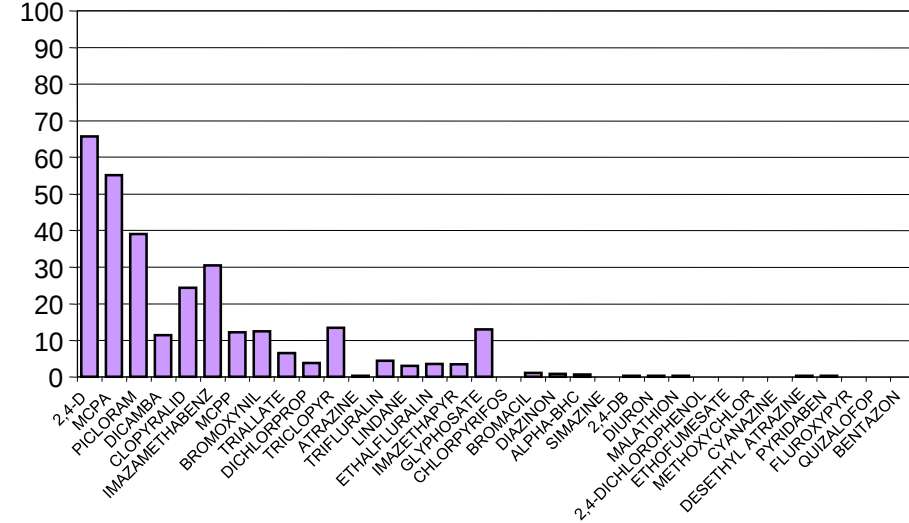


Agricultural Influence on Pesticides in Surface Water

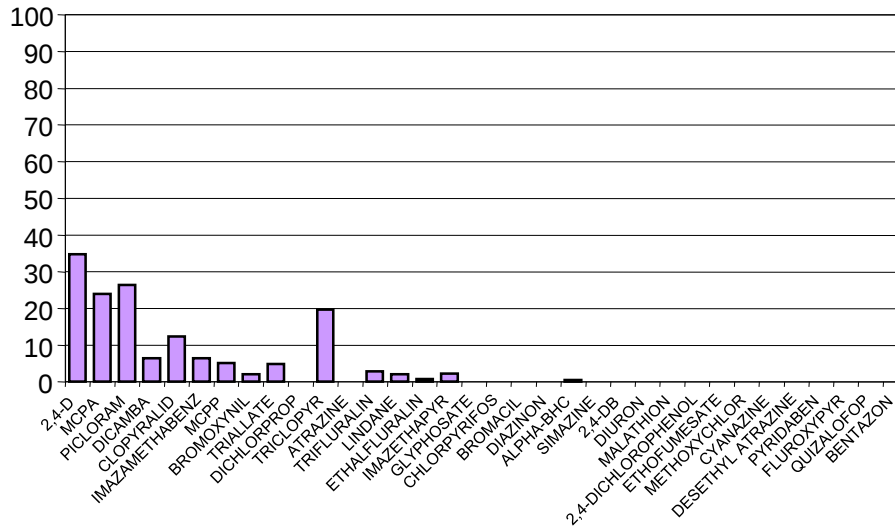
Irrigation Return Flows



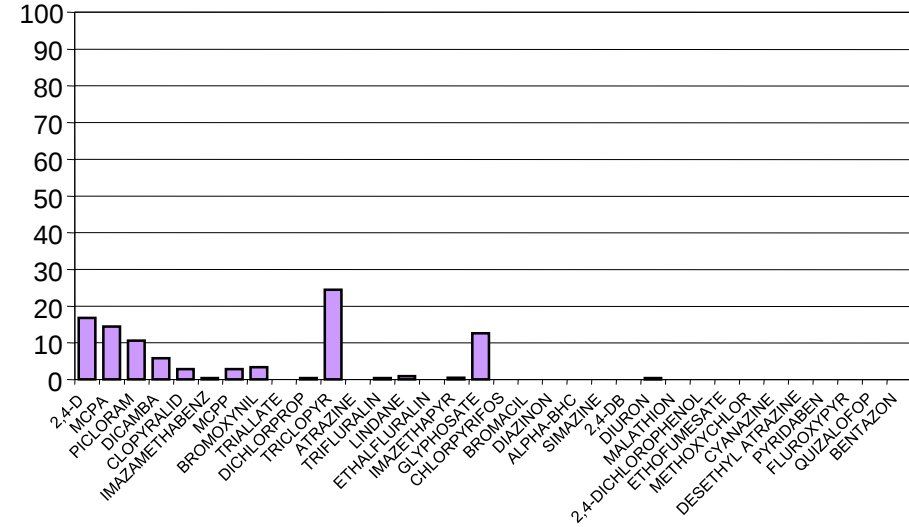
Streams in High Intensity Agriculture



Streams in Moderate Intensity Agriculture

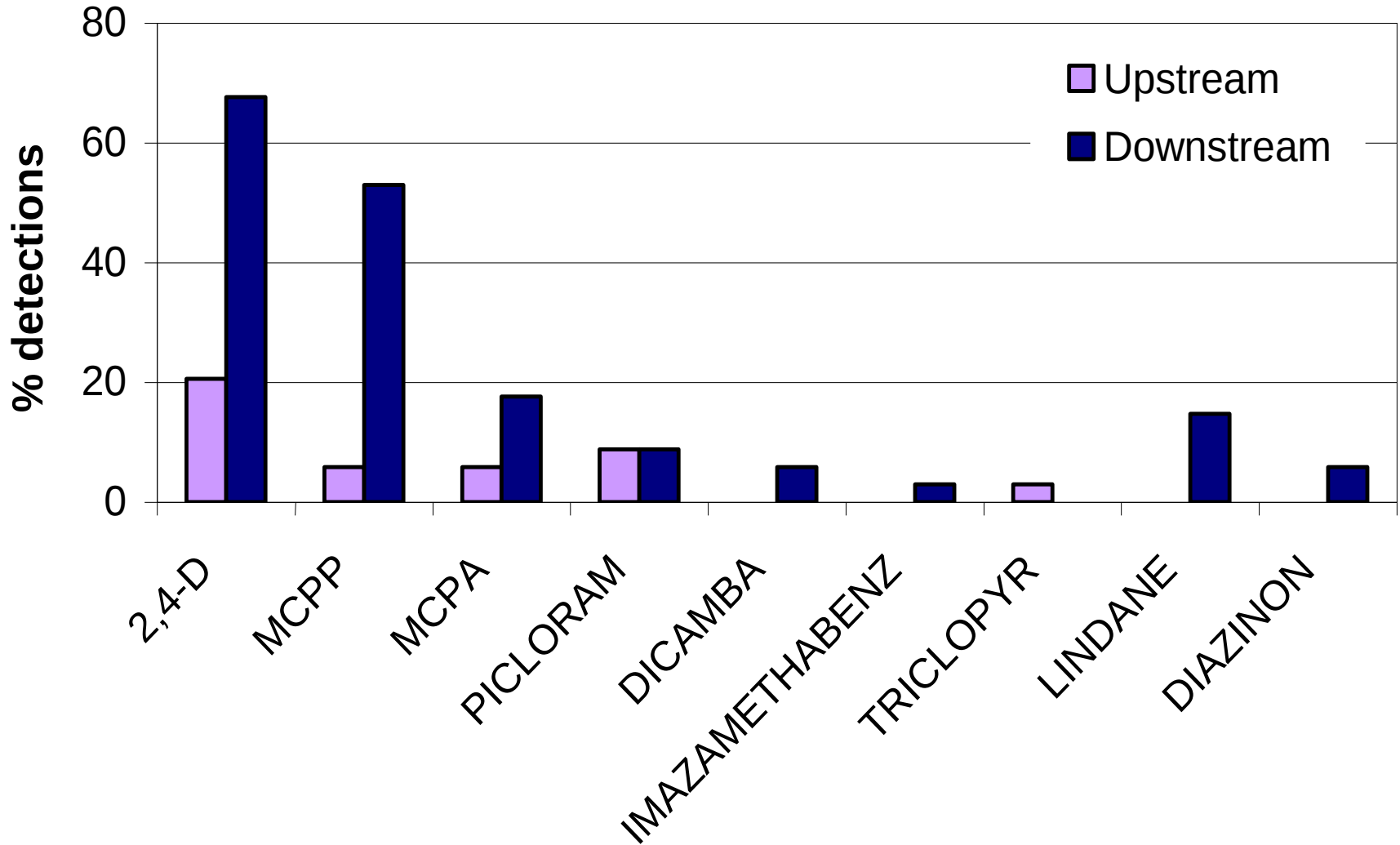


Streams in Low Intensity Agriculture



Urban Influence on Pesticides in Surface Water

Edmonton

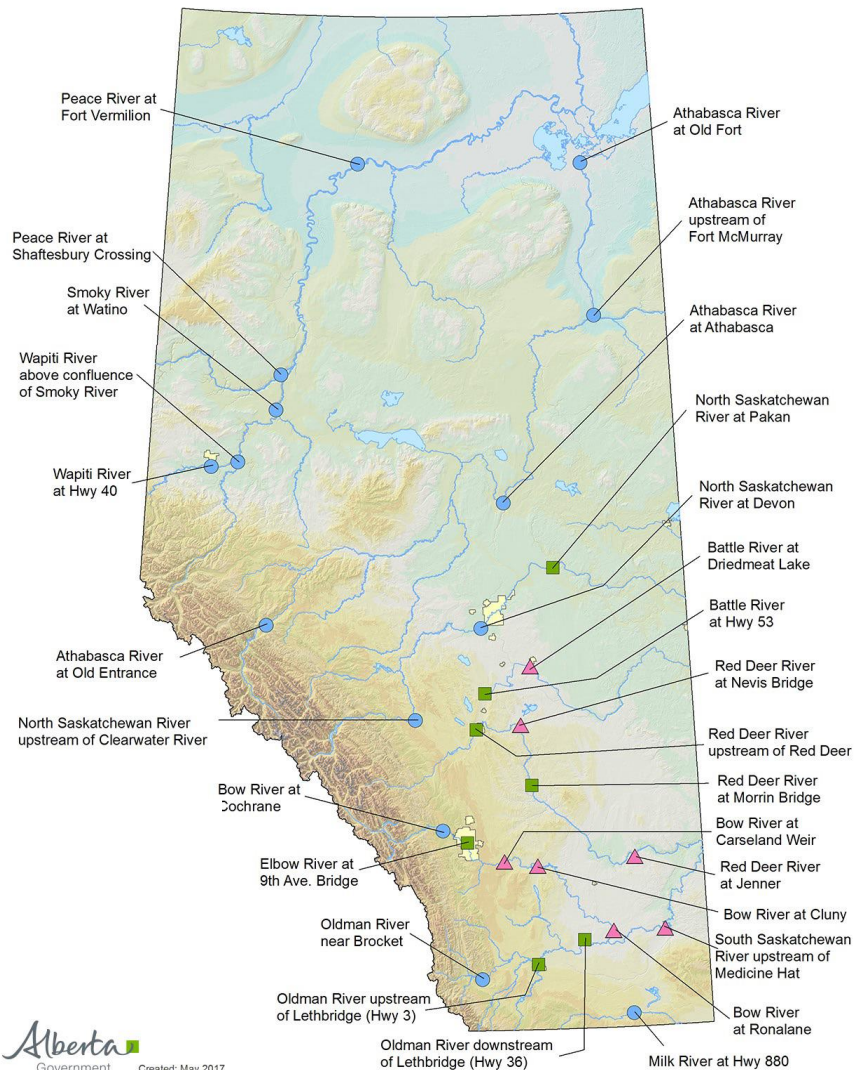


Urban Pesticide Issues

- **Domestic application rates up to 10X agriculture rates**
- **Applied more often in urban centres**

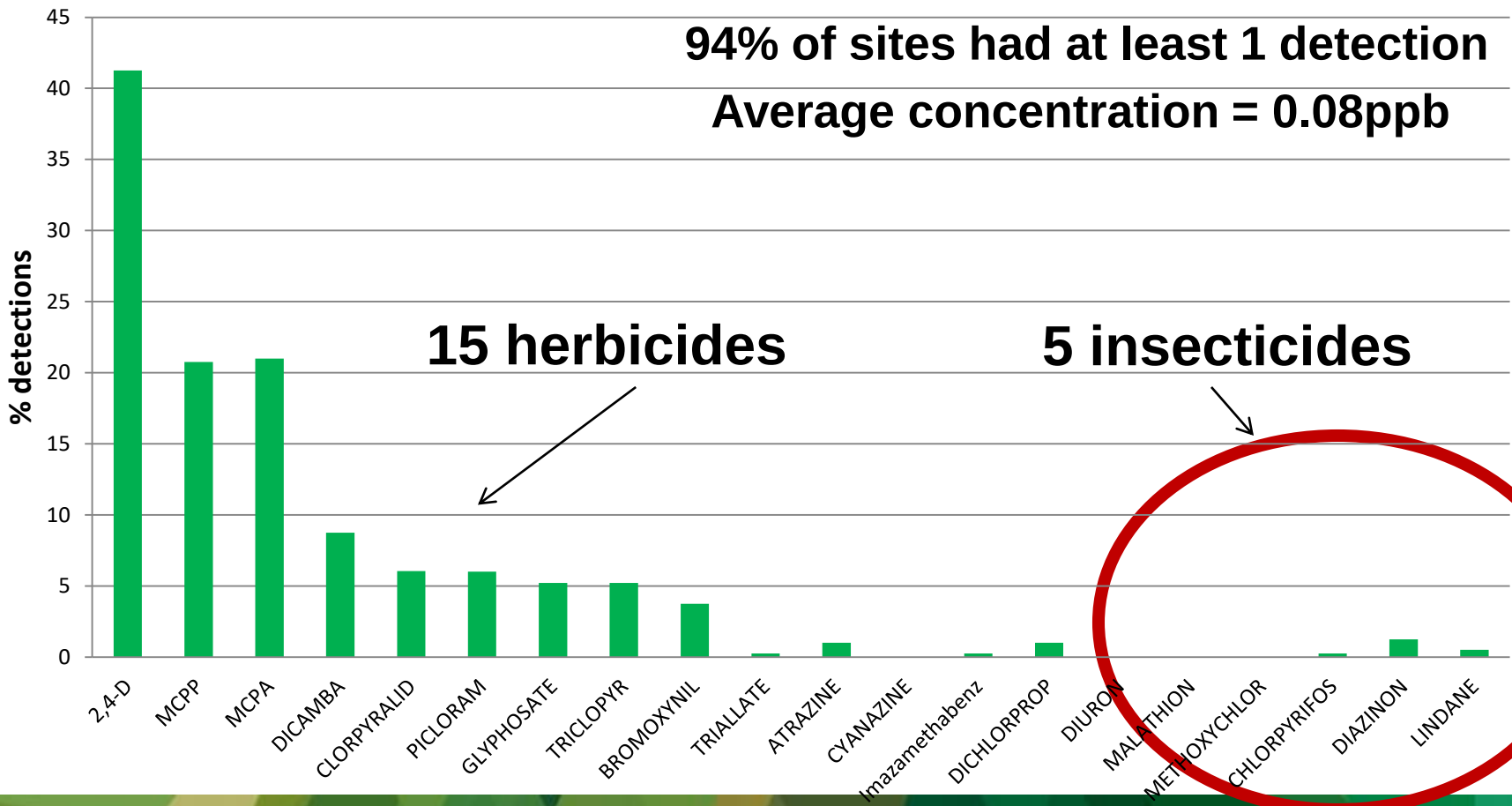


River Water Quality Monitoring 1995-2015



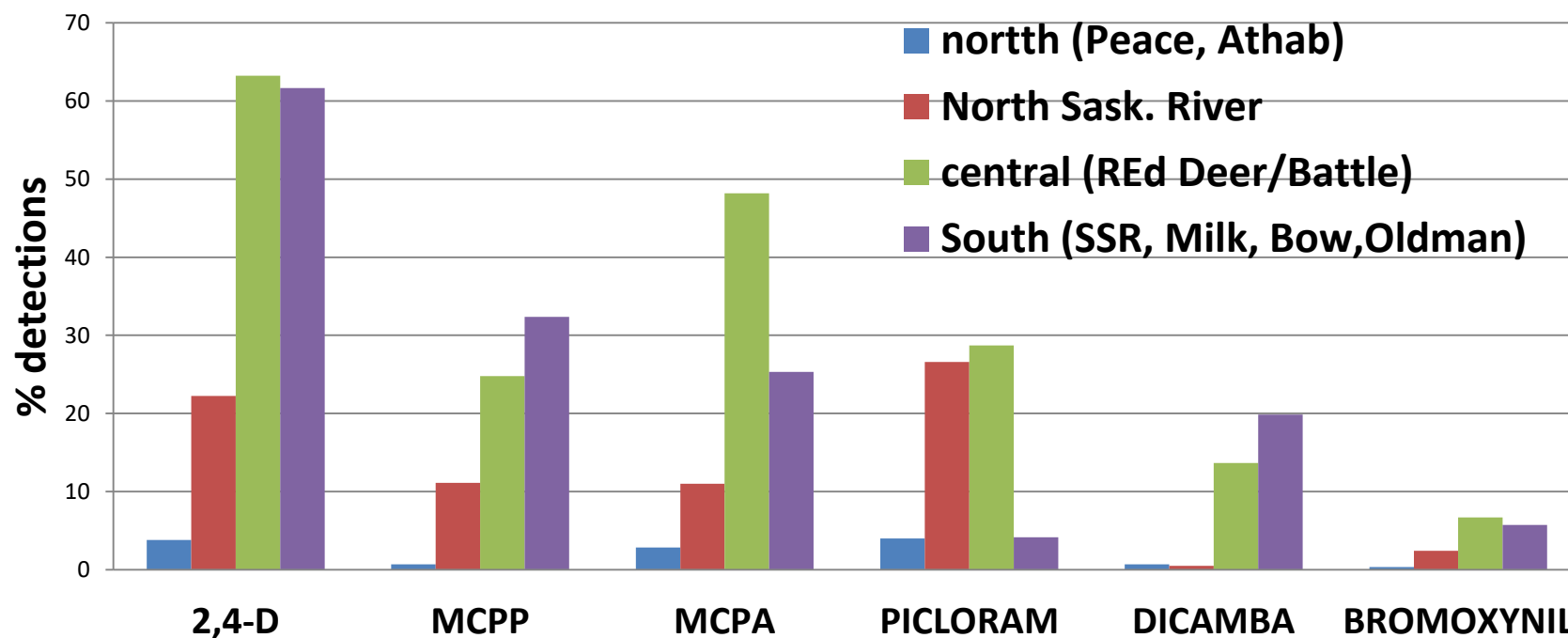
- Long-term monitoring of 28 sites across AB
- Rivers in all watersheds sampled
- Sample 4X/year
(May, June, July, August)
- 17 pesticide active ingredients analyzed
 - 13 herbicides
 - 4 insecticides

River Quality Monitoring Results 1995-2015 (6,729 samples)

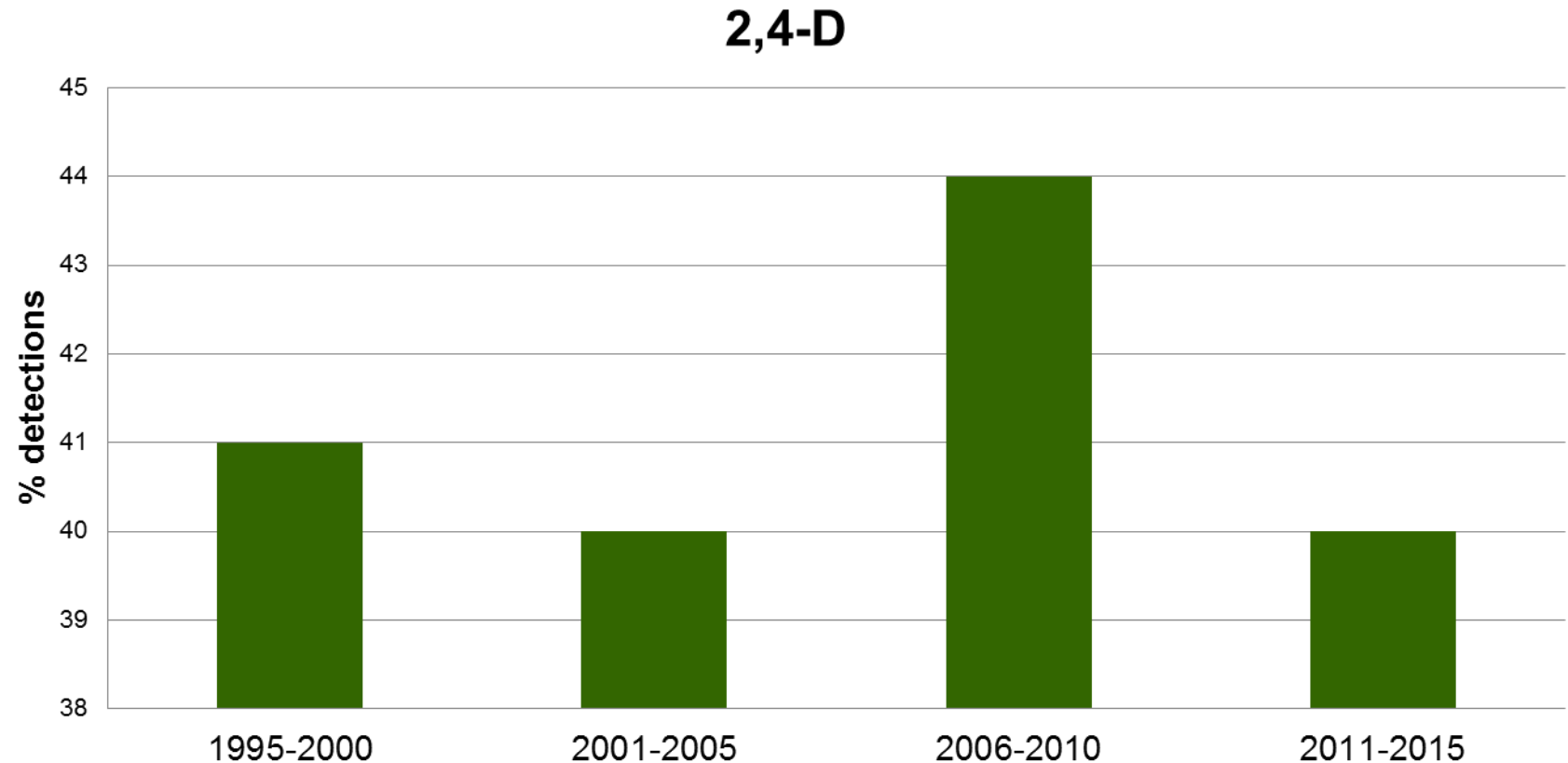


Herbicide Active Ingredient Detections by Region

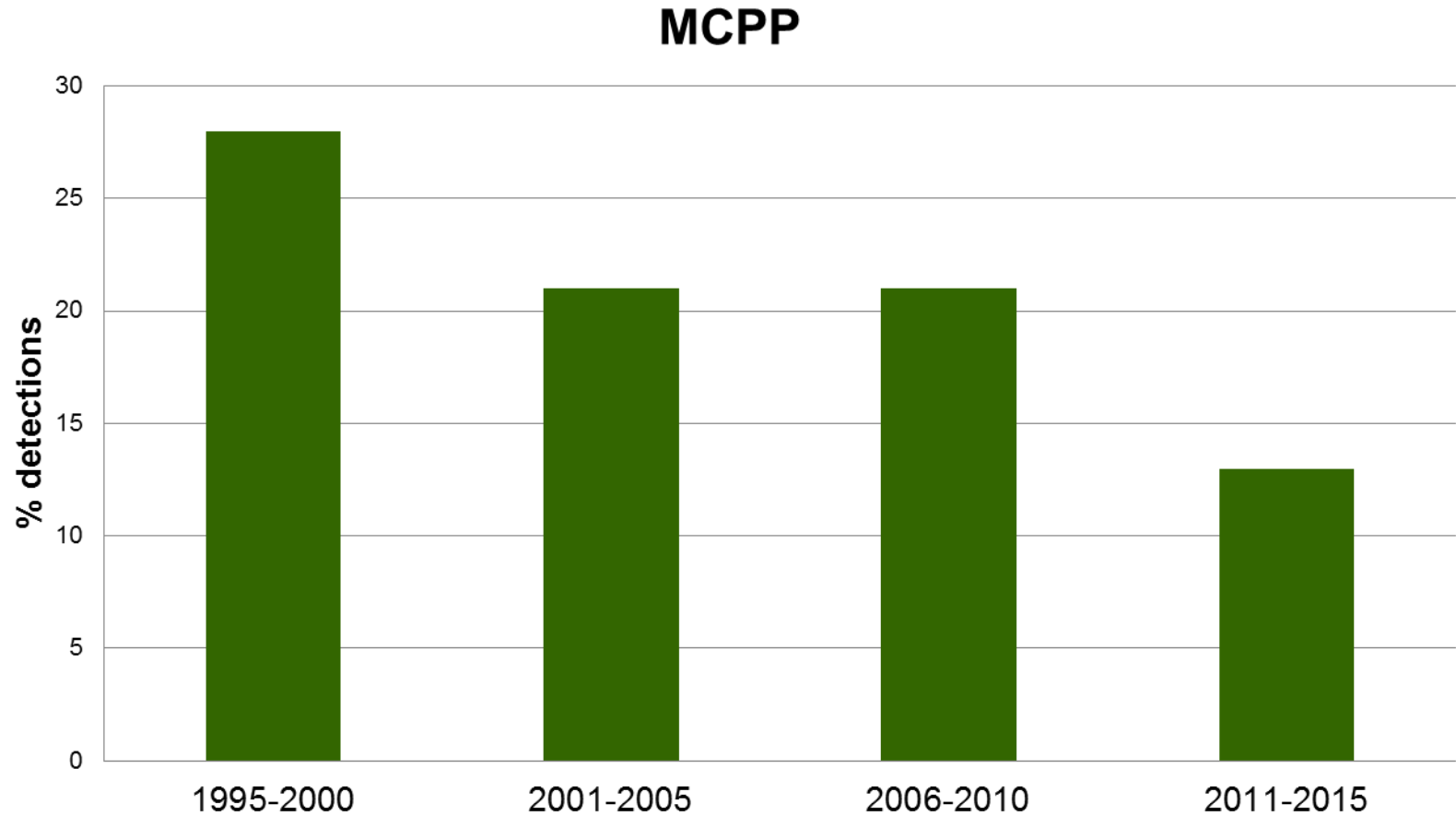
% detections by regions



Pesticide Detections Over Time

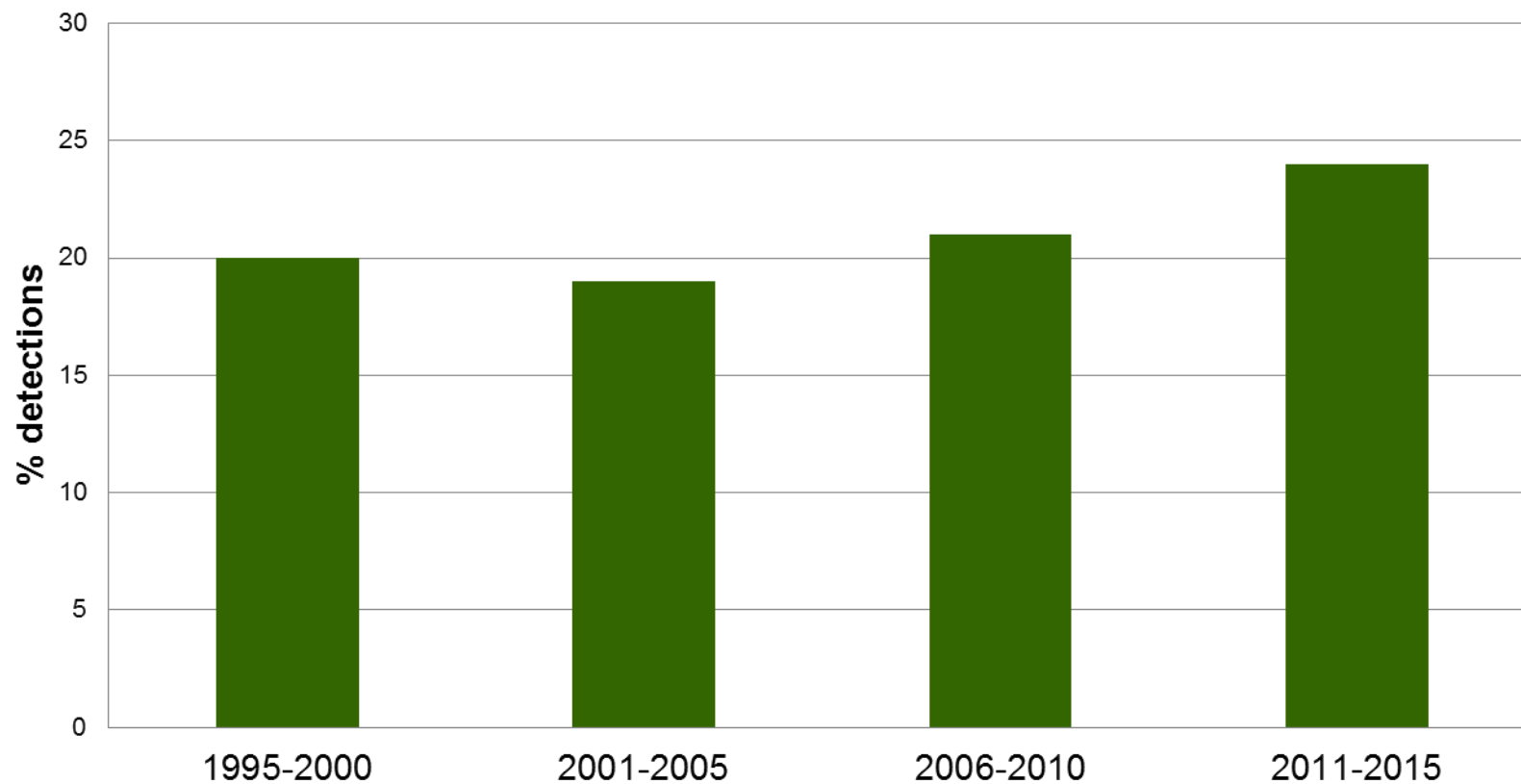


Pesticide Detections Over Time

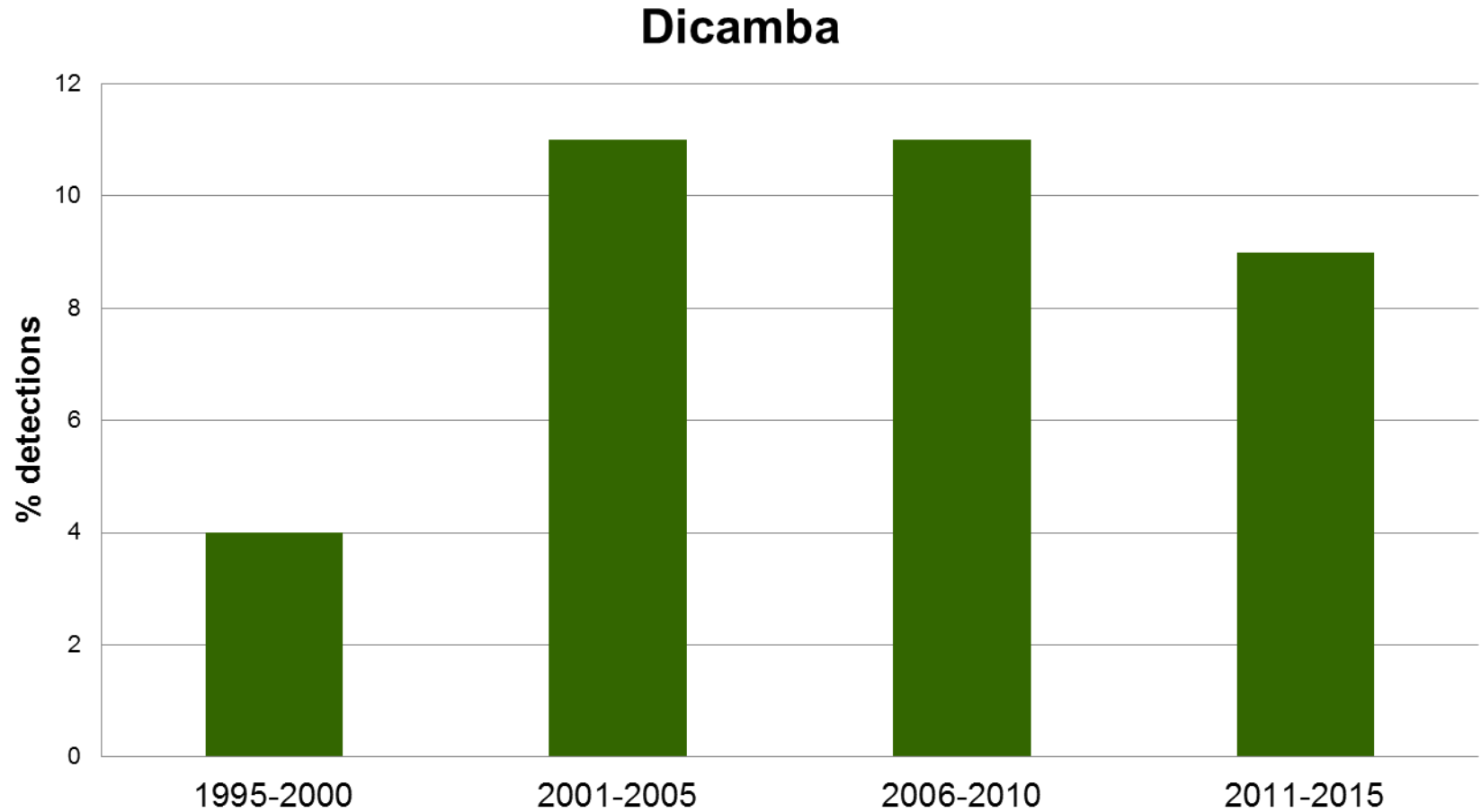


Pesticide Detections Over Time

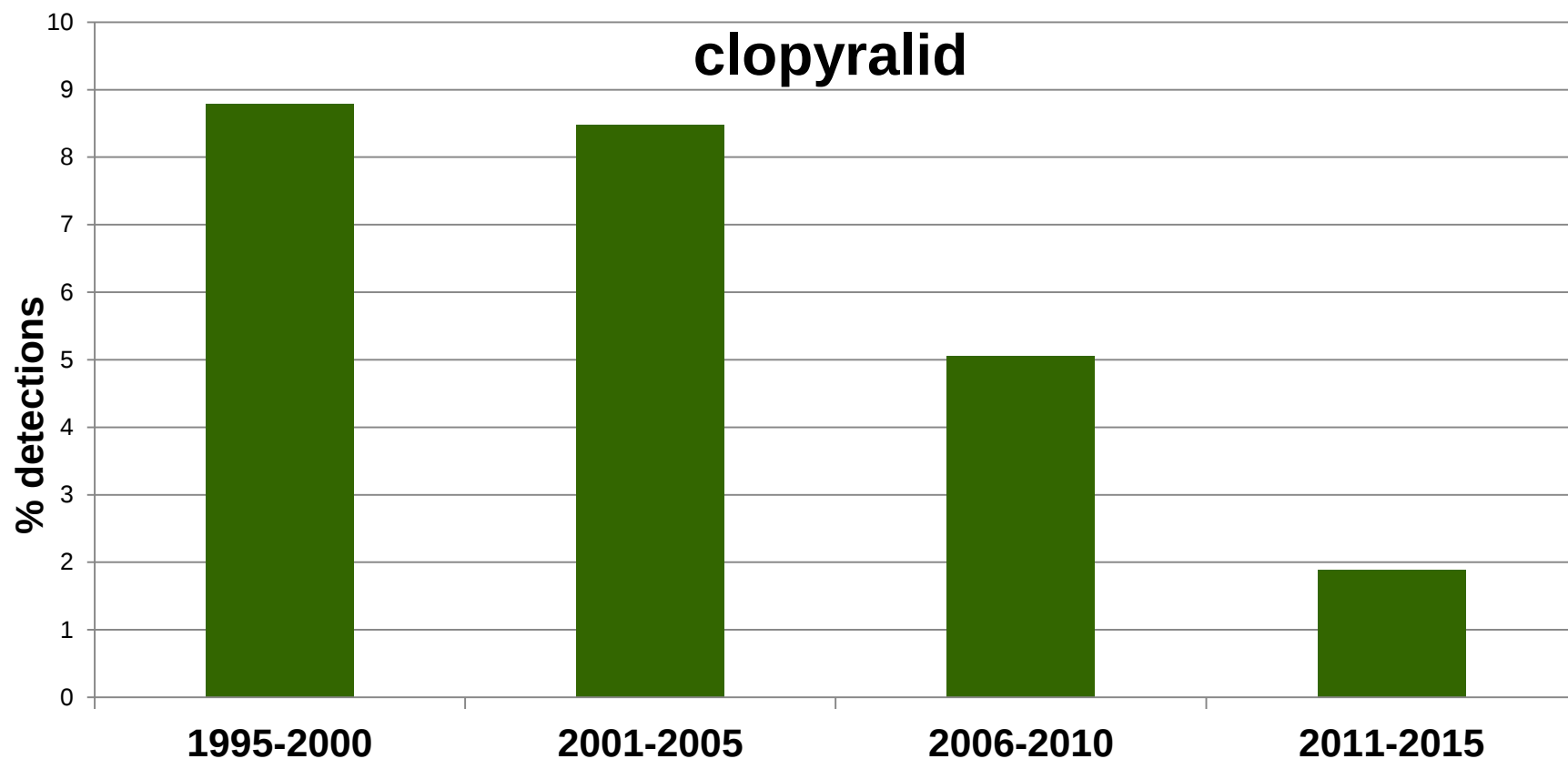
MCPA



Pesticide Detections Over Time

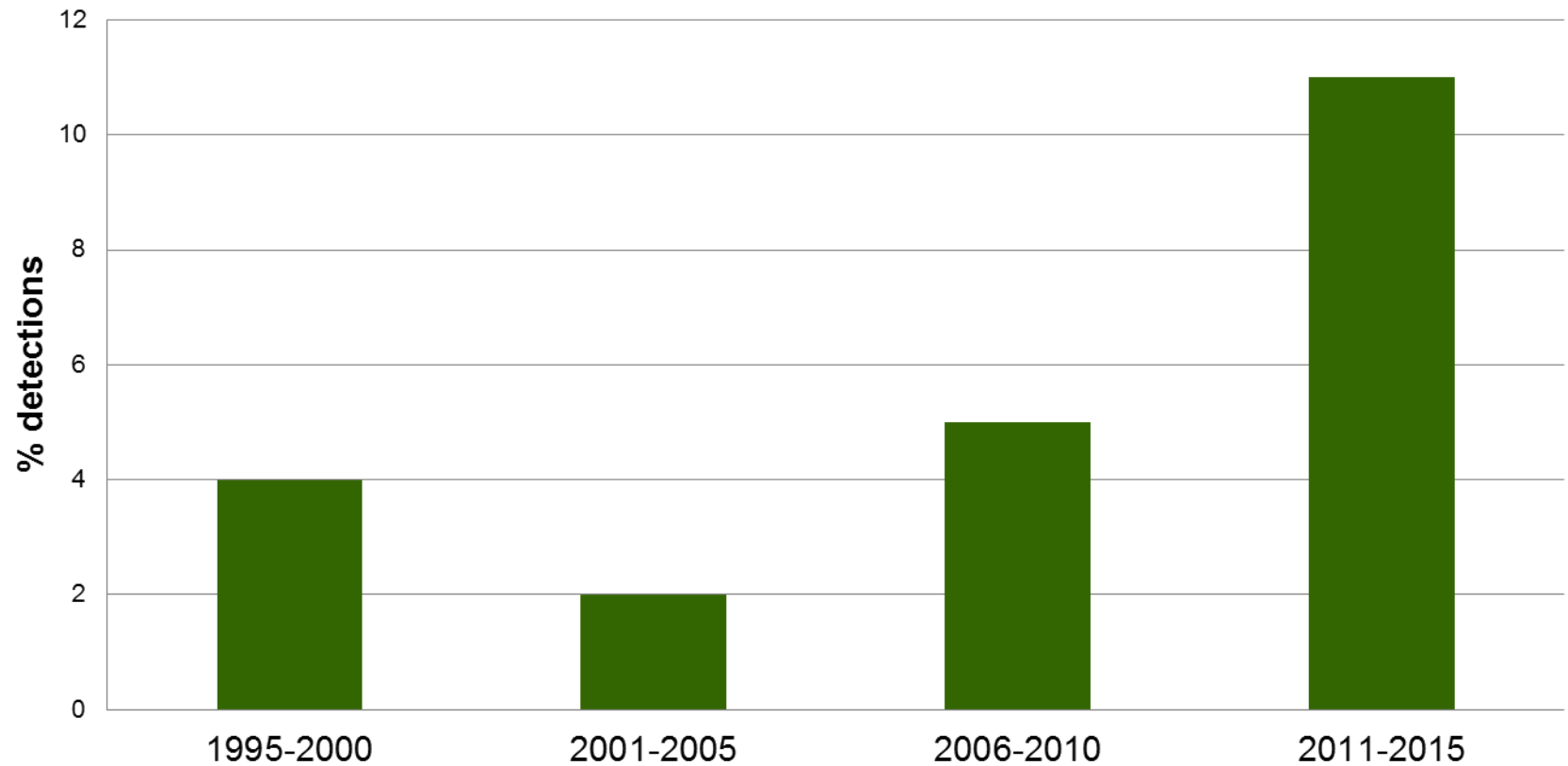


Pesticide Detections Over Time

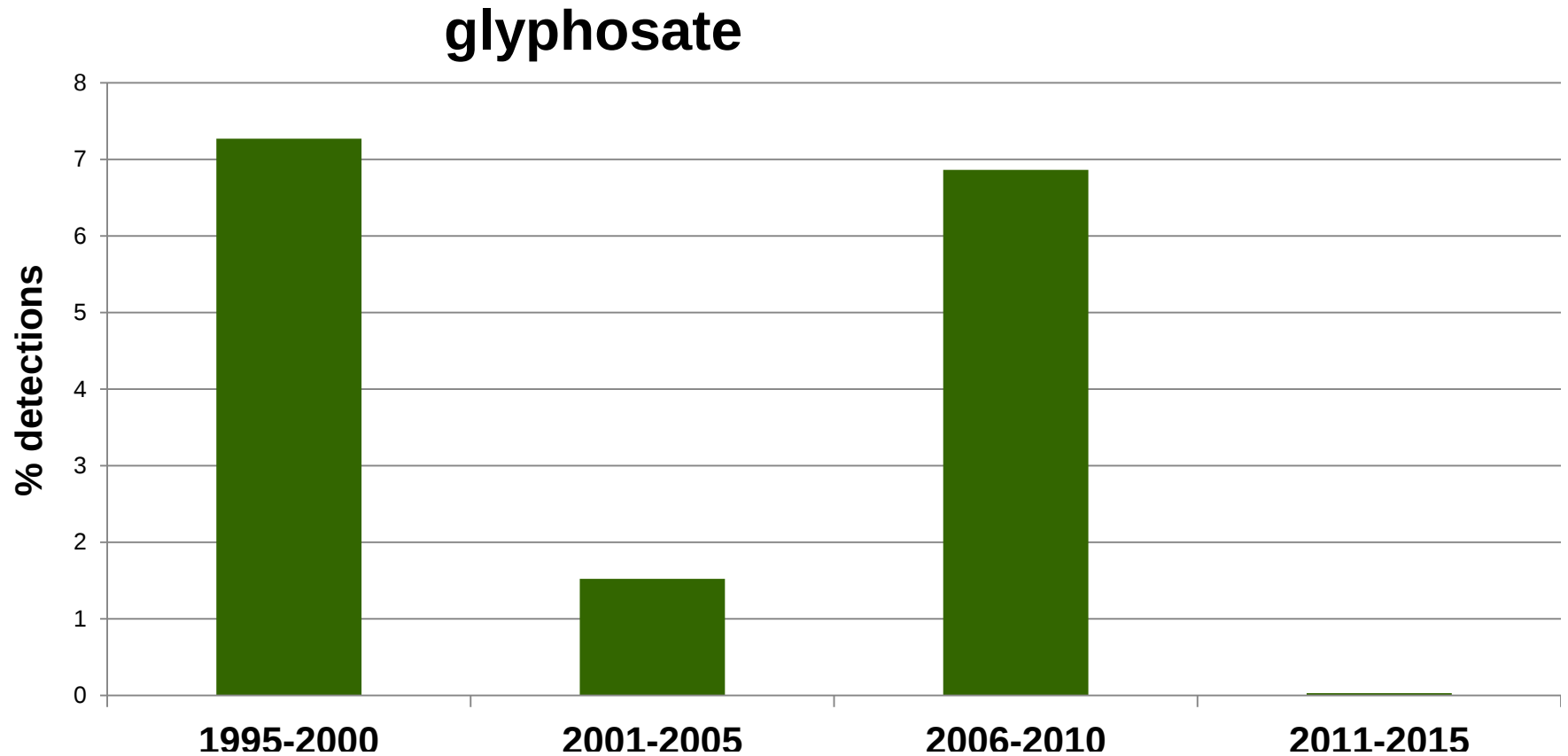


Pesticide Detections Over Time

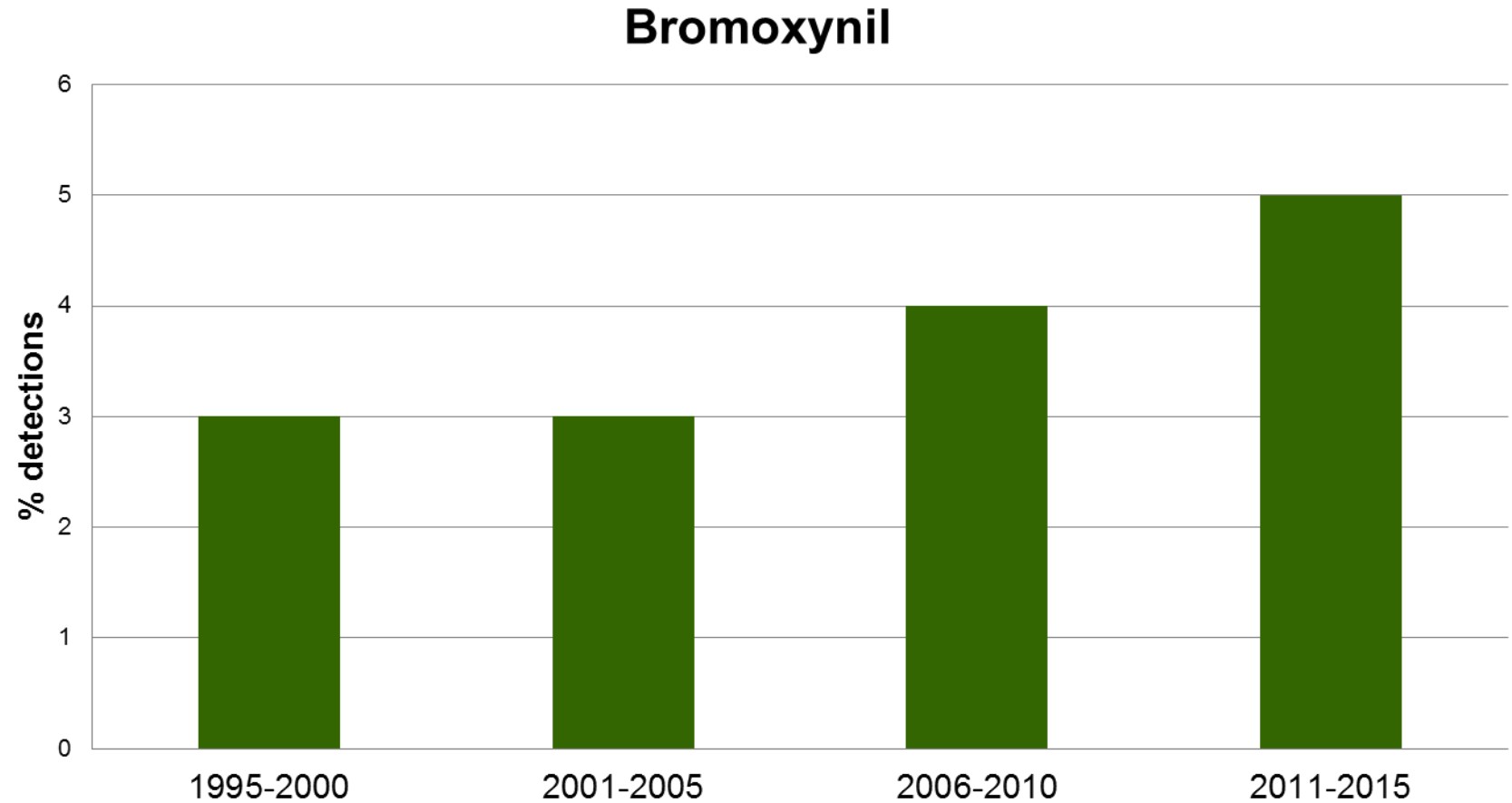
Picloram



Pesticide Detections Over Time

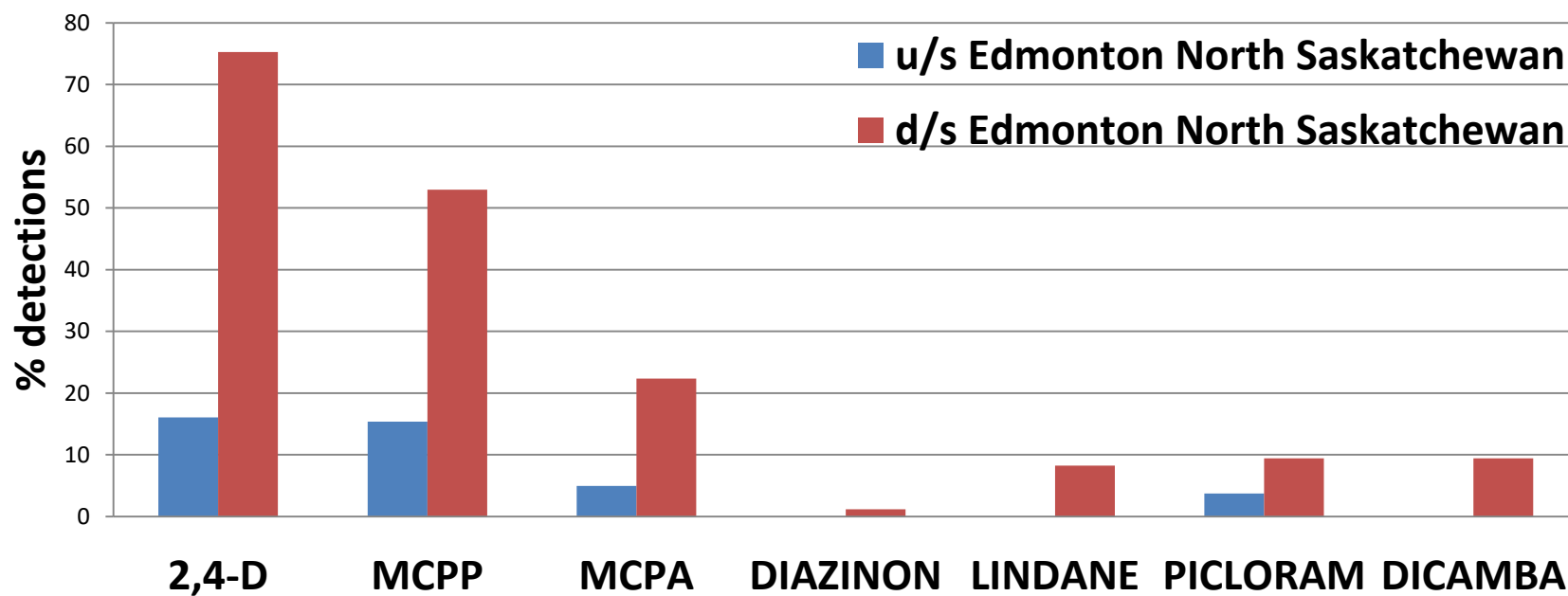


Pesticide Detections Over Time



River Monitoring – Urban Influence 1995-2015

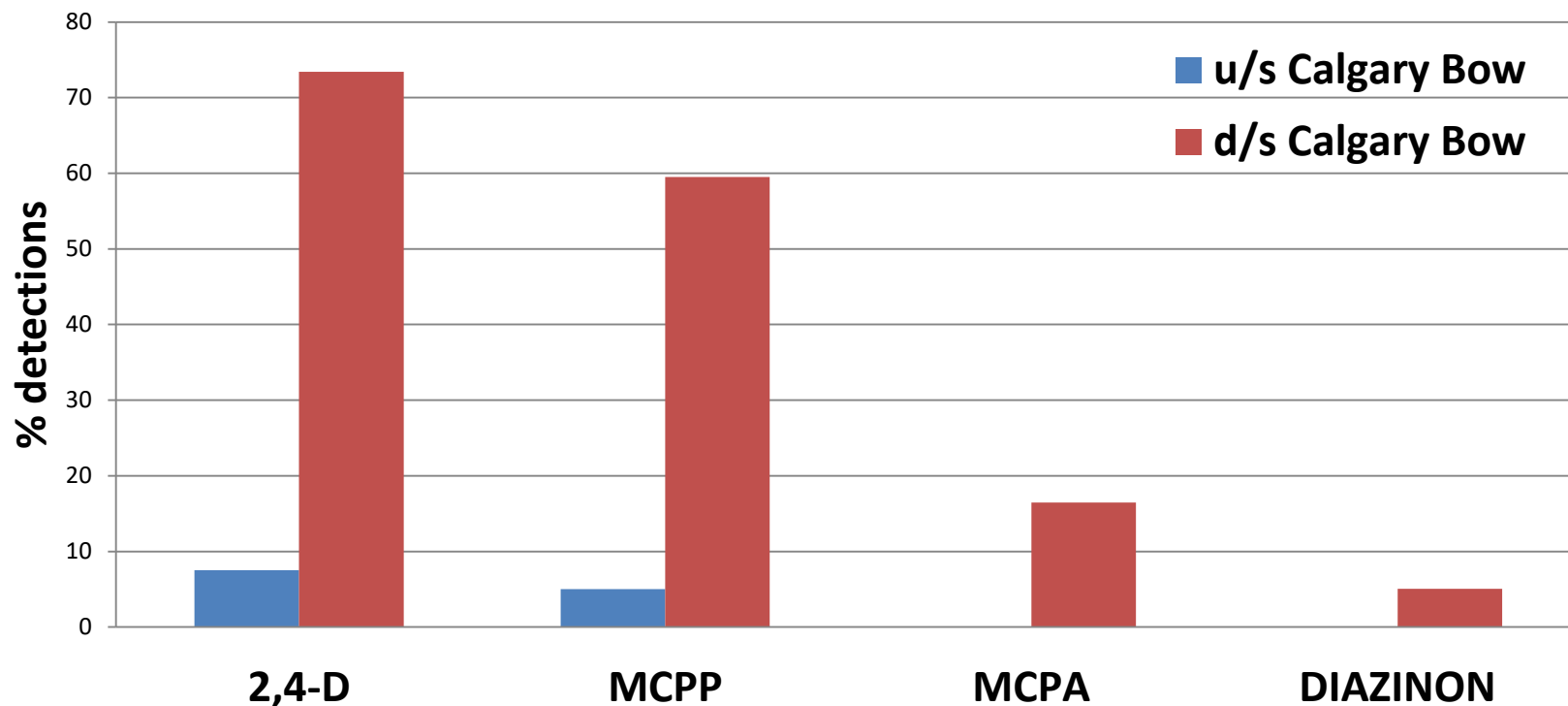
Urban Influence - Edmonton



River Monitoring – Urban Influence

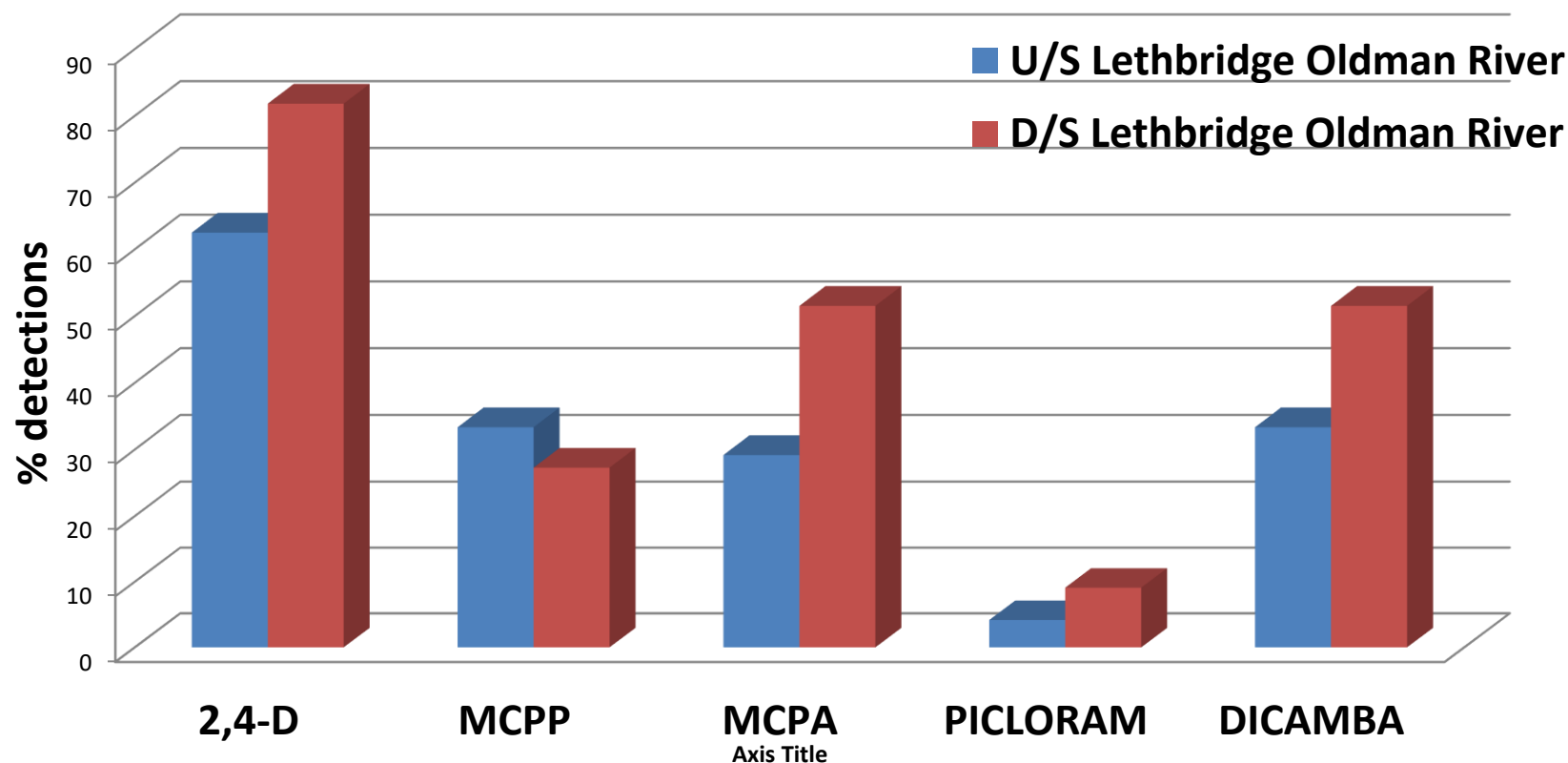
1995-2015

Urban Influence Calgary



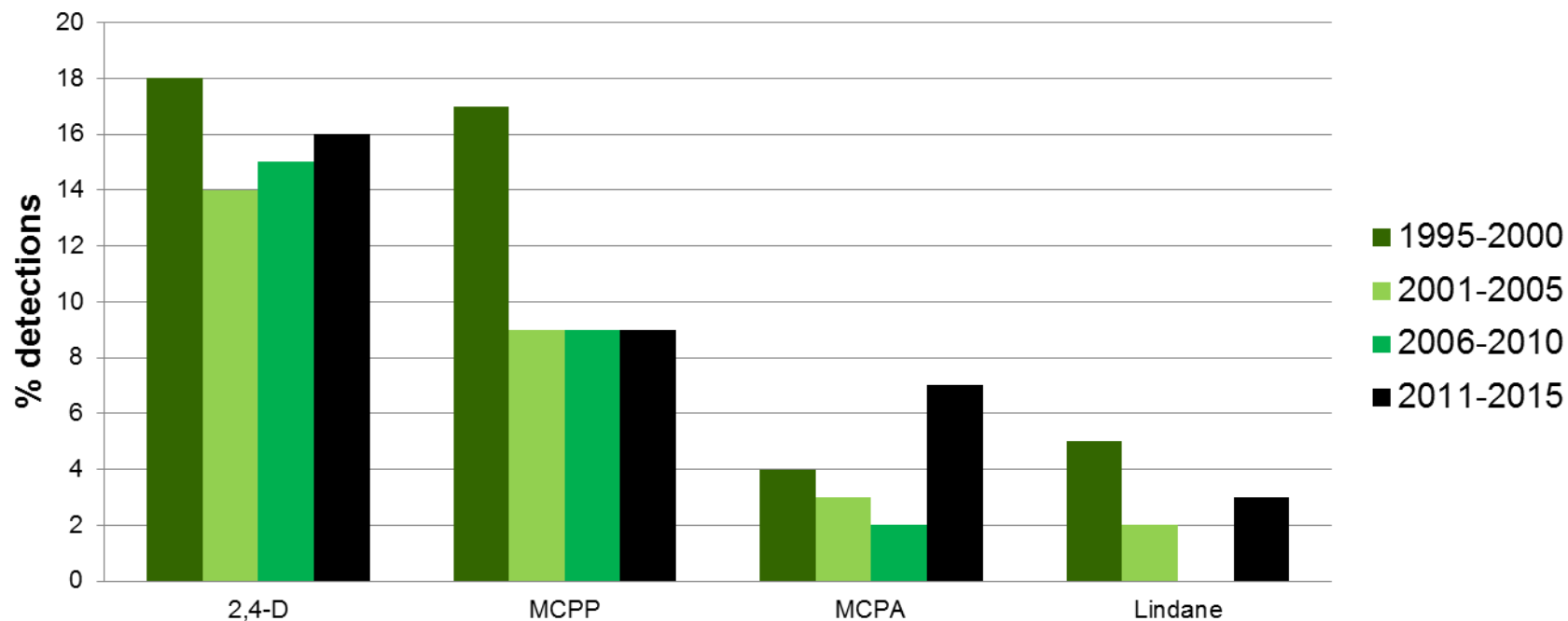
River Monitoring – Urban Influence 1995-2015

Urban Influence - Lethbridge



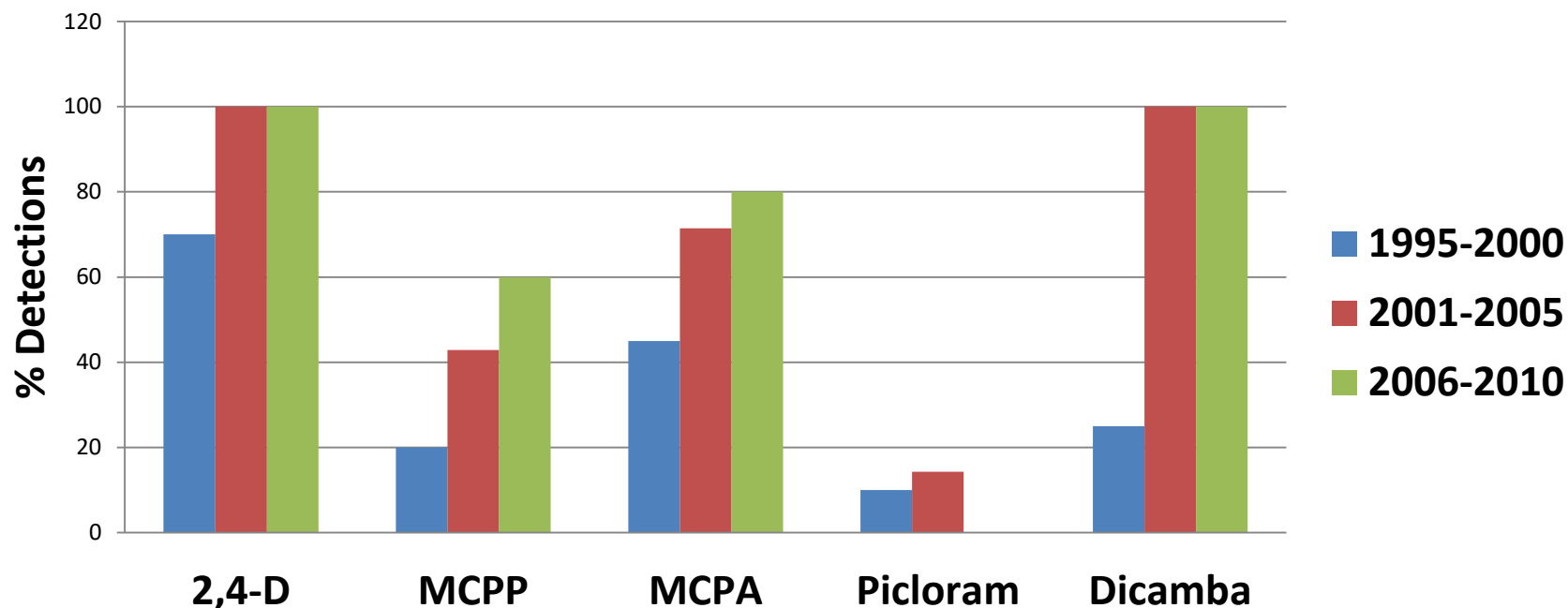
Urban Detections Trend Analysis 1995-2015

Urban Influence - Detections/yr downstream of Edmonton



Urban Detections Trend Analysis 1995-2010

Urban Influence detections/yr
downstream Lethbridge



River Water Monitoring: Compliance with CCME Guidelines

- 1 sample exceed PAL (*MCPA*)
 - 8% samples exceed Irrigation Guidelines (*dicamba*)
 - 0% samples exceed Drinking Water (*2,4-D*)
 - 0% samples exceed Livestock
-
- ***NOTE: Guidelines not always available and apply to single compounds (no cumulative effects included)***

River Water Monitoring: River Water Index Ranking

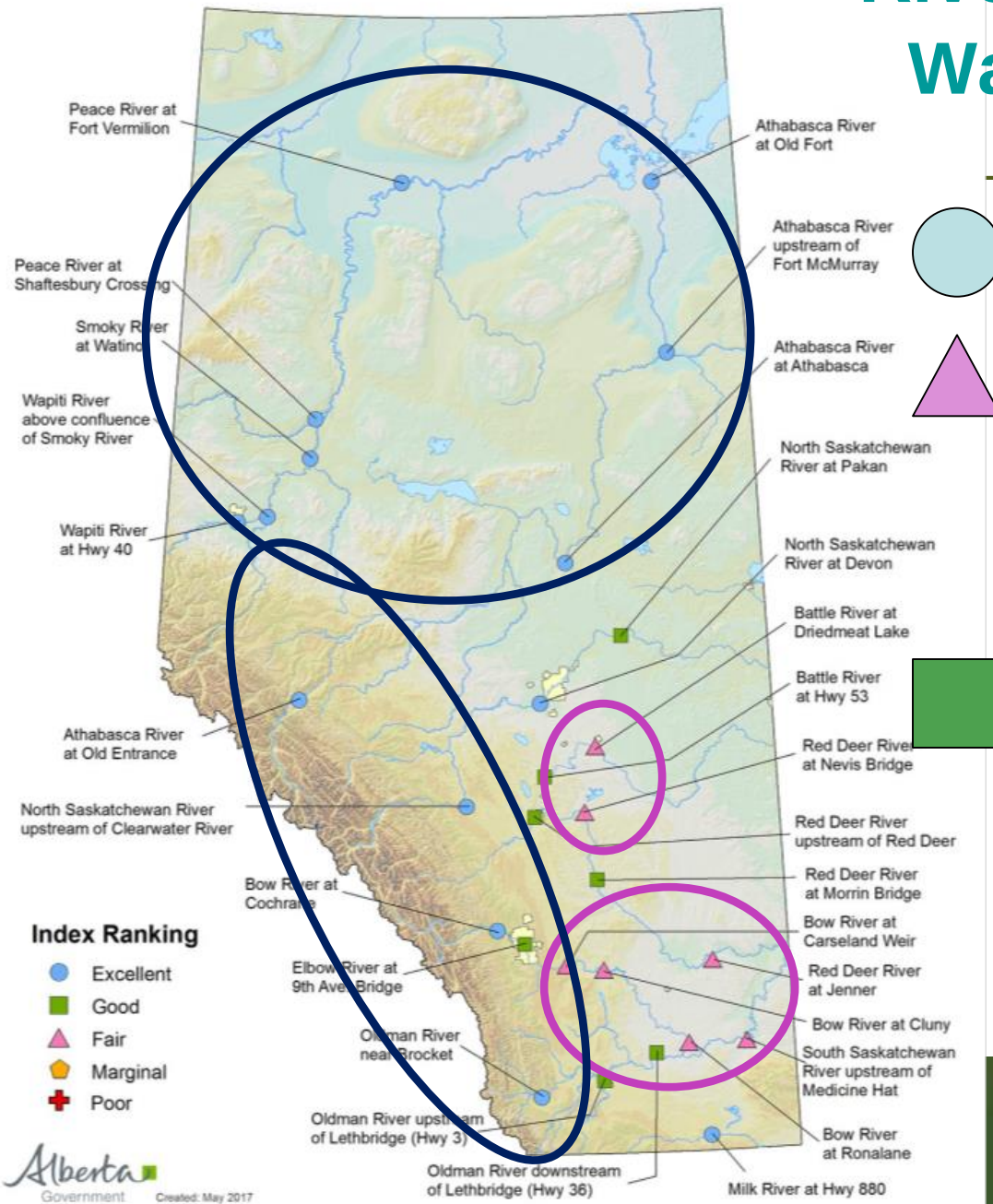
- Pesticides are evaluated based on detections in water.
- Conservative approach adopted because:
 - some pesticides do not have guidelines
 - pesticides do not occur naturally in the environment.

River Water Monitoring: River Water Index Ranking

- If exceedances of following levels (ug/L) were found, index lowered one level, if 2 exceedances found, then index lowered by another point

2,4-D	✓	0.005
MCPP	✓	0.005
MCPA	✓	0.005
DIAZINON	✓	0.005
BENZENEHEXACHLORIDE (Lindane)	✓	0.005
PICLORAM	✓	0.005
DICAMBA	✓	0.02
TRIALATE	✓	0.005
ATRAZINE	✓	0.005
BROMOXYNIL	✓	0.005
CYANAZINE	✓	0.05
MALATHION	✓	0.05
METHOXYCHLOR	✓	0.03
CHLORPYRIFOS	✓	0.005
IMAZAMETHABENZ	✓	0.05
DIURON	✓	0.2
DICHLORPROP	✓	0.005

River Water Monitoring Water Quality Index



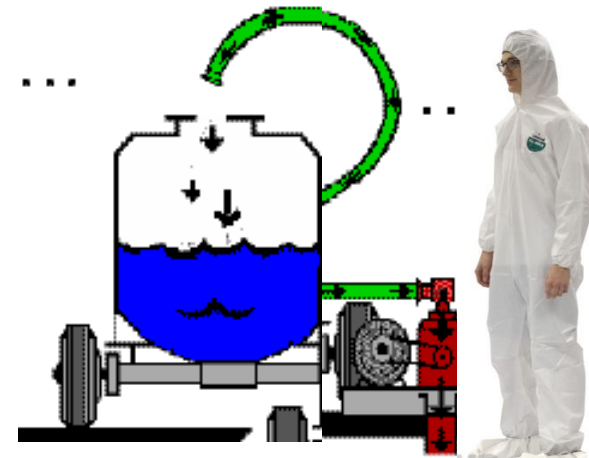
- 14 sites – excellent ranking
- 8 sites – fair
- Most fair sites in high intensity agriculture areas (including irrigation)
- 7 sites – good ranking
- Rankings established yearly and available on <http://aep/alberta.ca>

Activities Contributing to Pesticides in Water

- Largest contributors to pesticide contamination:
 - Applications near water
 - Applications near storm drains leading to water
 - Drift
- Other sources of pesticide contaminations:
 - Runoff leading to offsite contamination
 - Movement of soil containing pesticide residues
 - Evaporation of water (containing pesticides) from the treated sites

FILLING FROM A MUNICIPAL WATER SUPPLY OR OPEN BODY OF WATER

- Use nurse tanks
- Do not add pesticide at outlet or water body
- Maintain air gap
- Ensure adult is present and attentive to the filling at all times
- Use a backflow prevention device



QUESTIONS?

Vivianne Servant
Pesticide Specialist
Alberta Environment and Parks
780 538-8054
Vivianne.servant@gov.ab.ca