

# Characterisation of Water Bodies in Ireland in relation to Agricultural Pressures



**Sustainable Grassland Systems and the WFD**

**Teagasc**

**Johnstown Castle**

**Wexford**

**13 November 2008**

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# Outline

- WFD Article 5 Report
- Risk Assessment
- Ecological Status
- Land use v Water Quality
- Implications for Programme of Measures

# WFD Article 5 Report – Characterisation Report

- Designates/defines Water Bodies
  - – GIS layers
- Human impact – risk assessment
  - Risk of not reaching Good Status
- Wide range of pressures analysed
- But here we are dealing mainly with diffuse Agriculture
- Risk Assessment used in the design of the monitoring programmes
- Monitoring Programmes provide status information
- Status information underpins Programme of Measures

# WFD Main Objectives

1. Maintaining existing High and Good Status where it exists
  2. Restoring less than Good Status water bodies
    - Target of 'at least' Good status
- 
- The status targets were set by politicians
    - Council of Ministers and European Parliament
    - 10 years of discussion and debate before final WFD signed into law in Oct 2000.

# Ecological Status

- WFD emphasises the importance of ecological integrity
- Aquatic species act like the Canary in the mine – they are indicators of a broader threat
- Salmon, freshwater pearl mussels, crayfish, otters, etc., are inherently valuable in themselves *but* they also act as indicators of the quality of our environment
- If Status is poor we can ‘expect the unexpected’ - adverse impacts such as
  - *Cryptosporidium* outbreaks,
  - *E. coli*,
  - Toxics – herbicides, pesticides, ‘gender benders’, etc.
  - Heavy metals - lead, copper, cadmium
  - Flood damage, etc.



# Ecological Status

- Ecological Status is determined by the departure of aquatic communities from their natural or 'reference' state
- Ecological Status is defined by Biological Quality elements
  - Fish,
  - Macroinvertebrates and
  - Plant communities,  
    **AND** Supporting Elements such as
  - Hydromorphology and
  - Physico-chemical quality elements
    - nutrients, oxygen conditions, etc.
- 'Chemical' Status is determined separately for 'dangerous substances'

# Ecological Status – Biological Quality Elements

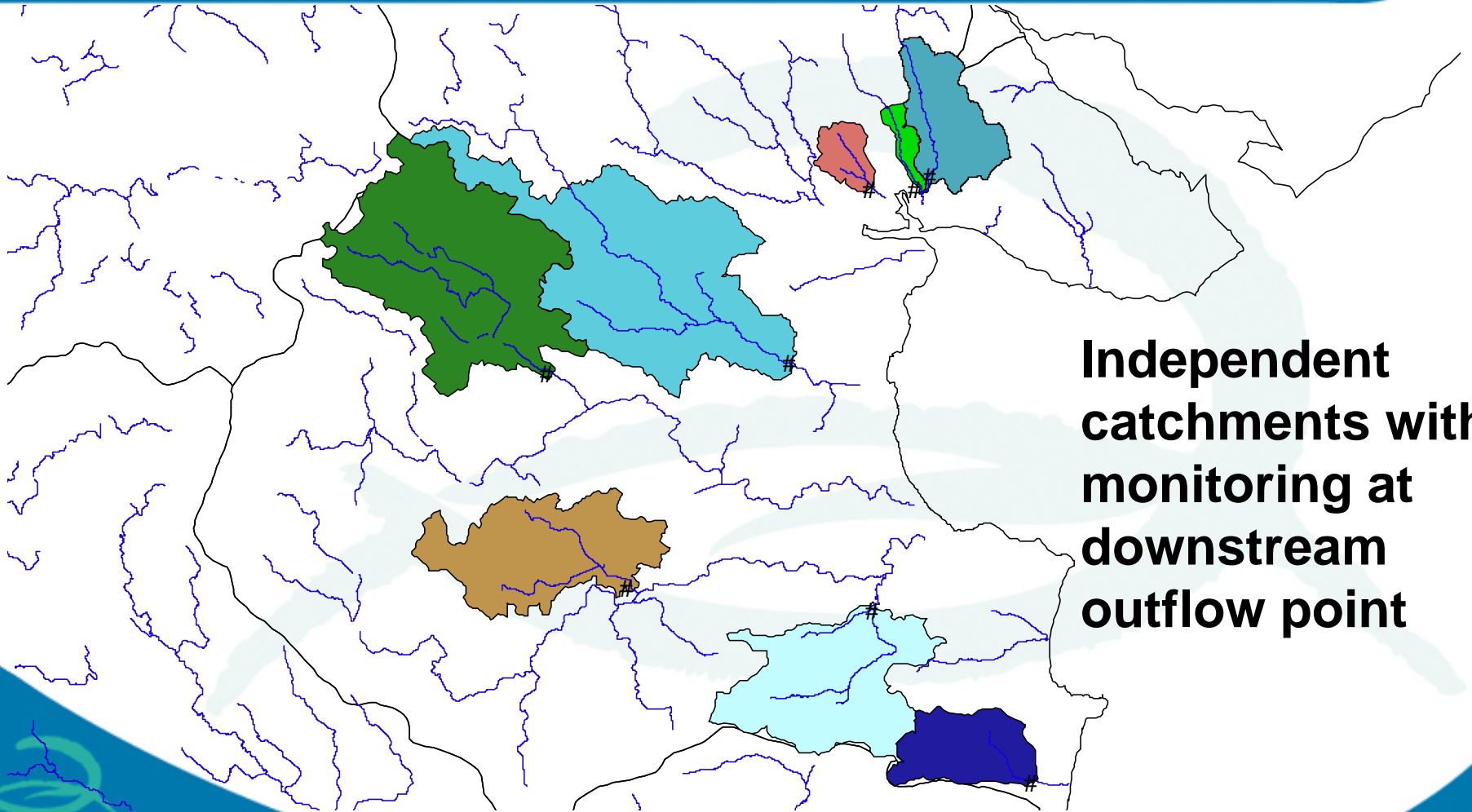
- Macroinvertebrates – an important Biological Quality Element
- 24x7 monitors of water quality
- One-off pollution events apparent for months after impact
- Affected by eutrophication – oxygen, algae, etc.
- One-year life cycles – so takes months to recover
- Similarly, with fish kills – can take years to restore normal population



# Characterisation and Diffuse Risk Assessment

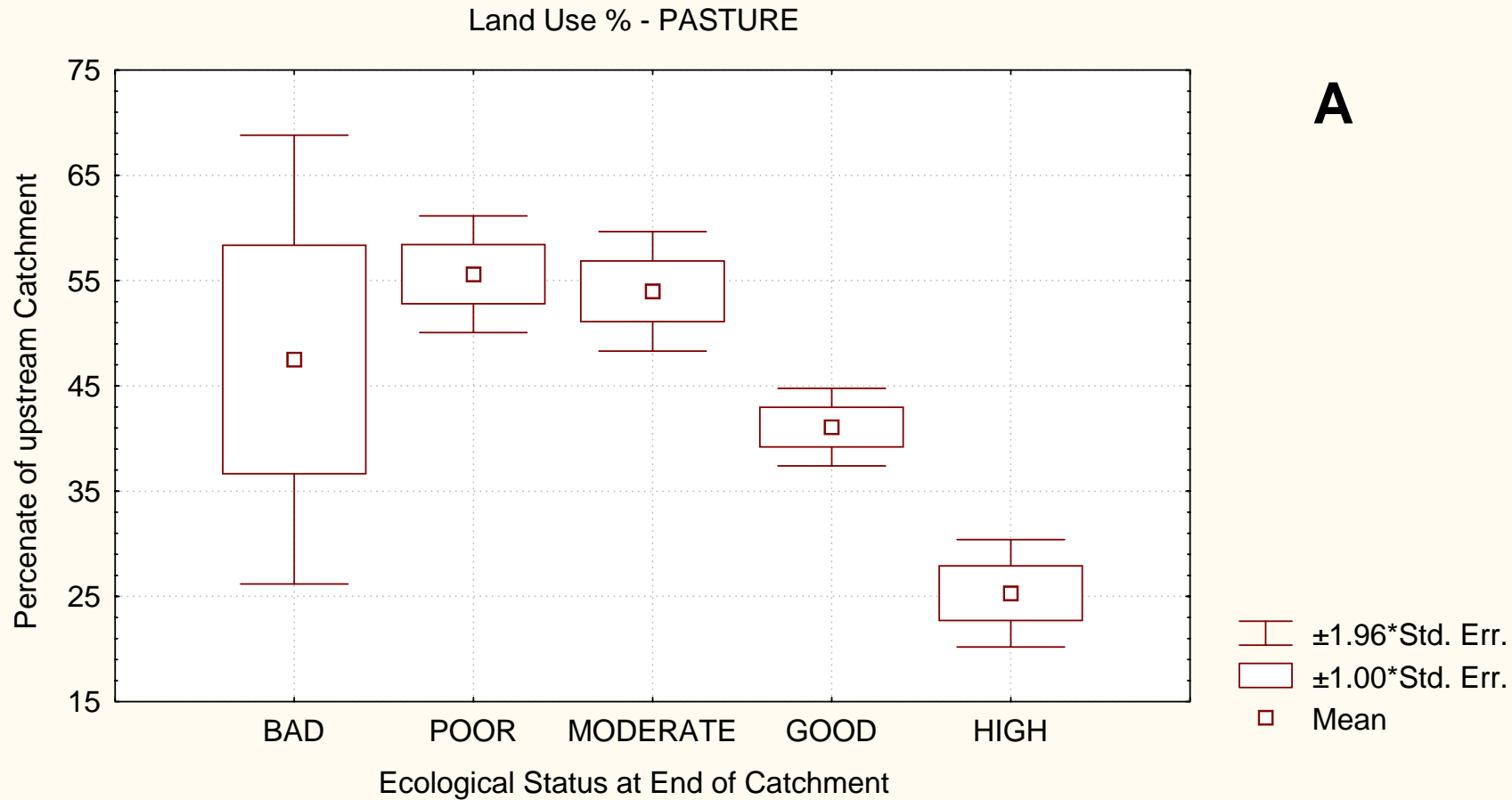
- Comparison between upstream land use and downstream Status
- Over 3000 catchments outlined nationally – using DEM
- Monitoring data for outflow point at end of catchment
- Subsets of 500 to 800 catchments chosen randomly – but no nexted subcatchments – all hydrologically independent
- Percentage land use – pasture, tillage, forestry, urban, etc., in upstream catchment is compared with ecological status at outflow point

# Characterisation and Risk Assessment



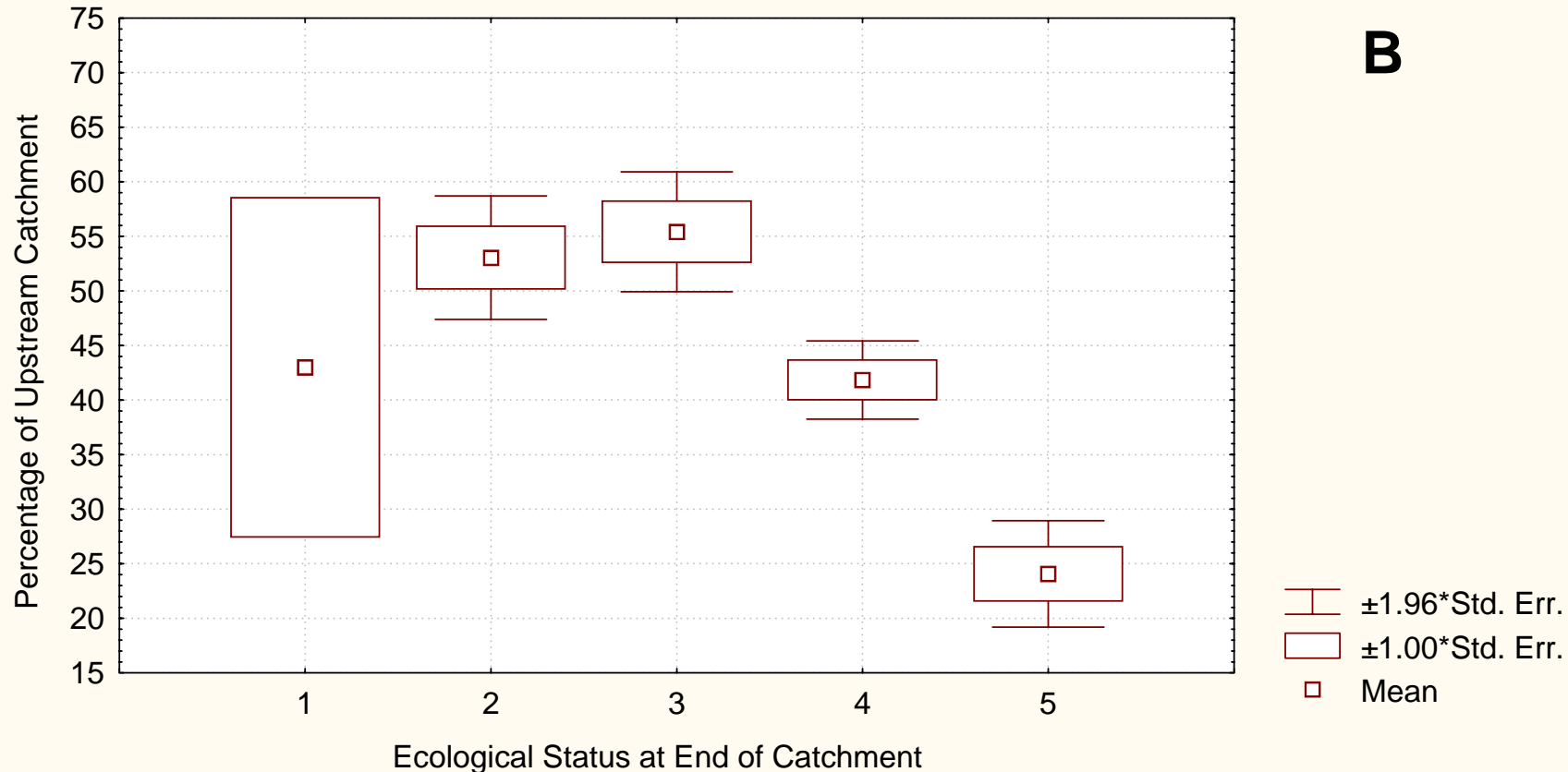
**Independent  
catchments with  
monitoring at  
downstream  
outflow point**

# Land use v Ecological Status for 541 Independent Catchments



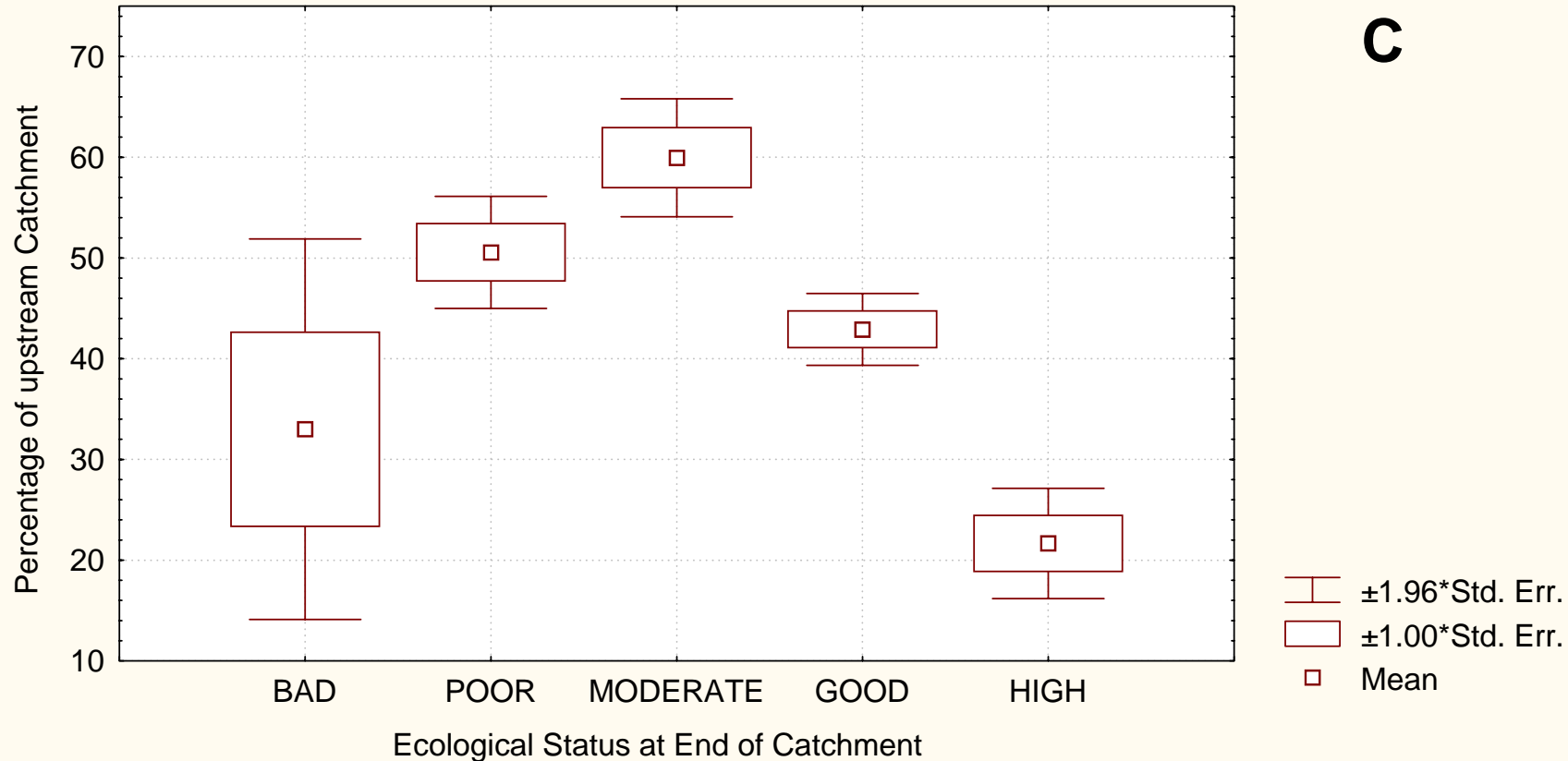
# Land use v Ecological Status for 560 Independent Catchments

Land Use % - Pasture (560 Catchments)

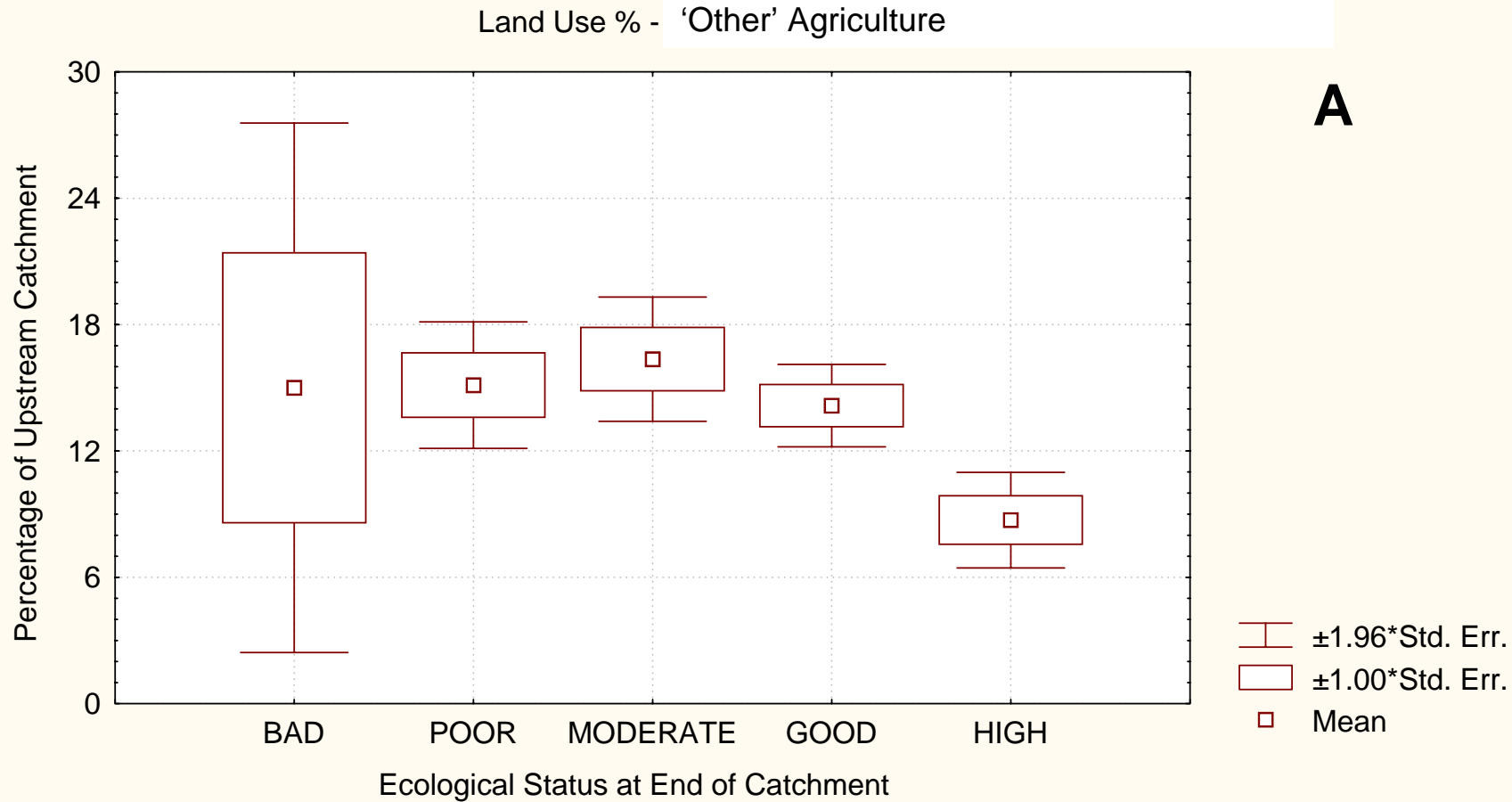


# Land use v Ecological Status for 508 Independent Catchments

Land Use % - Pasture (508 Catchments)



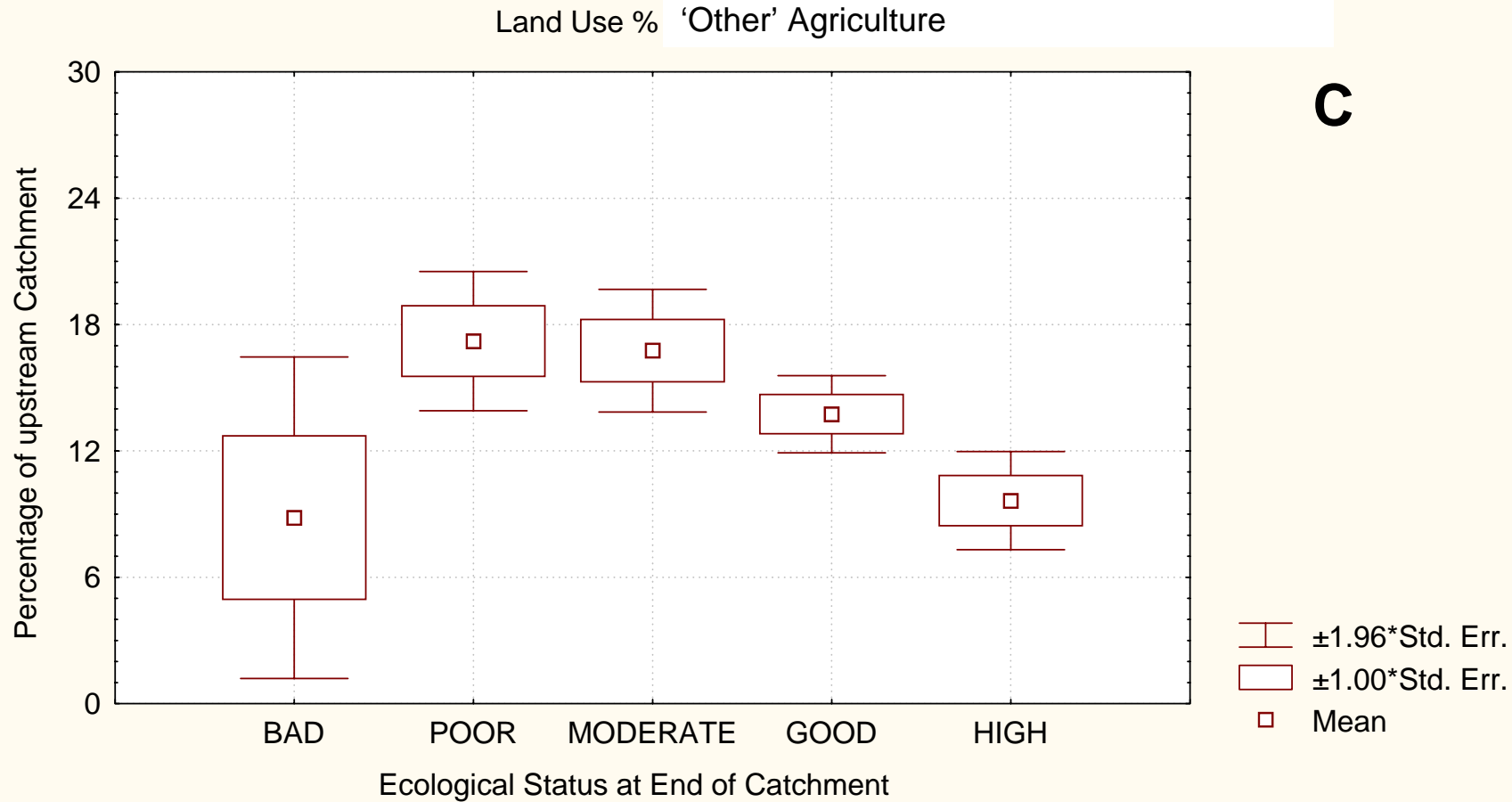
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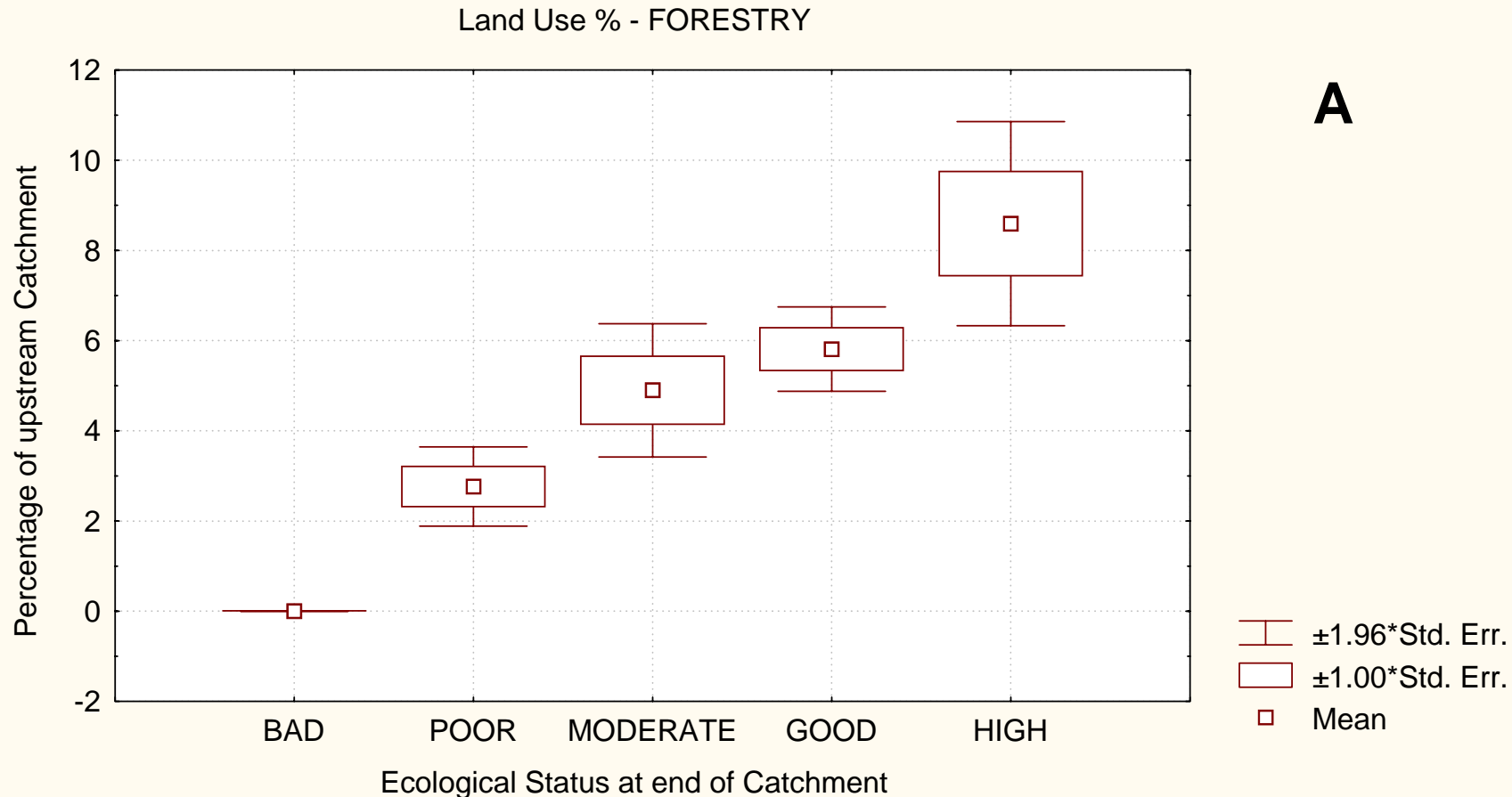
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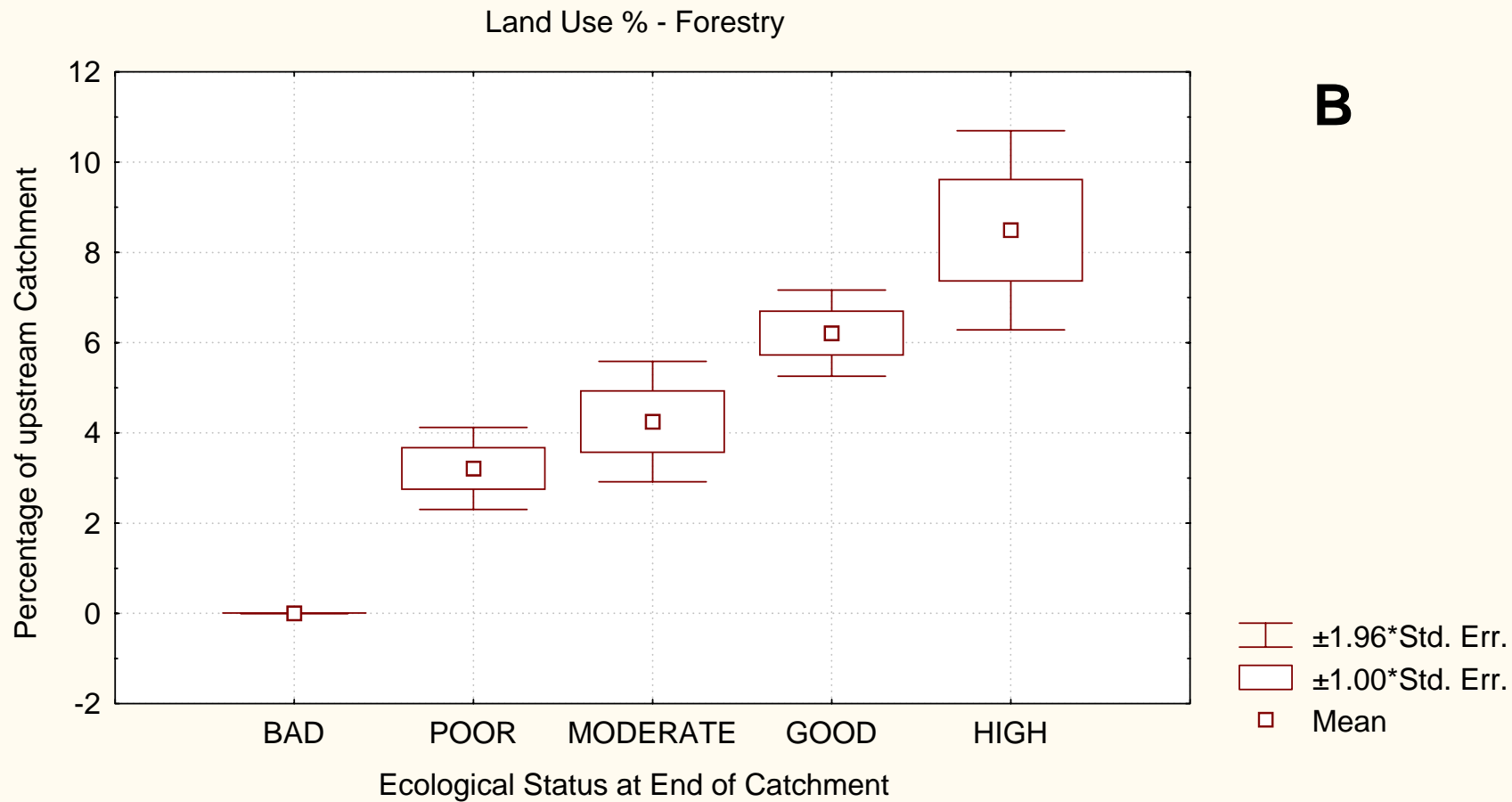
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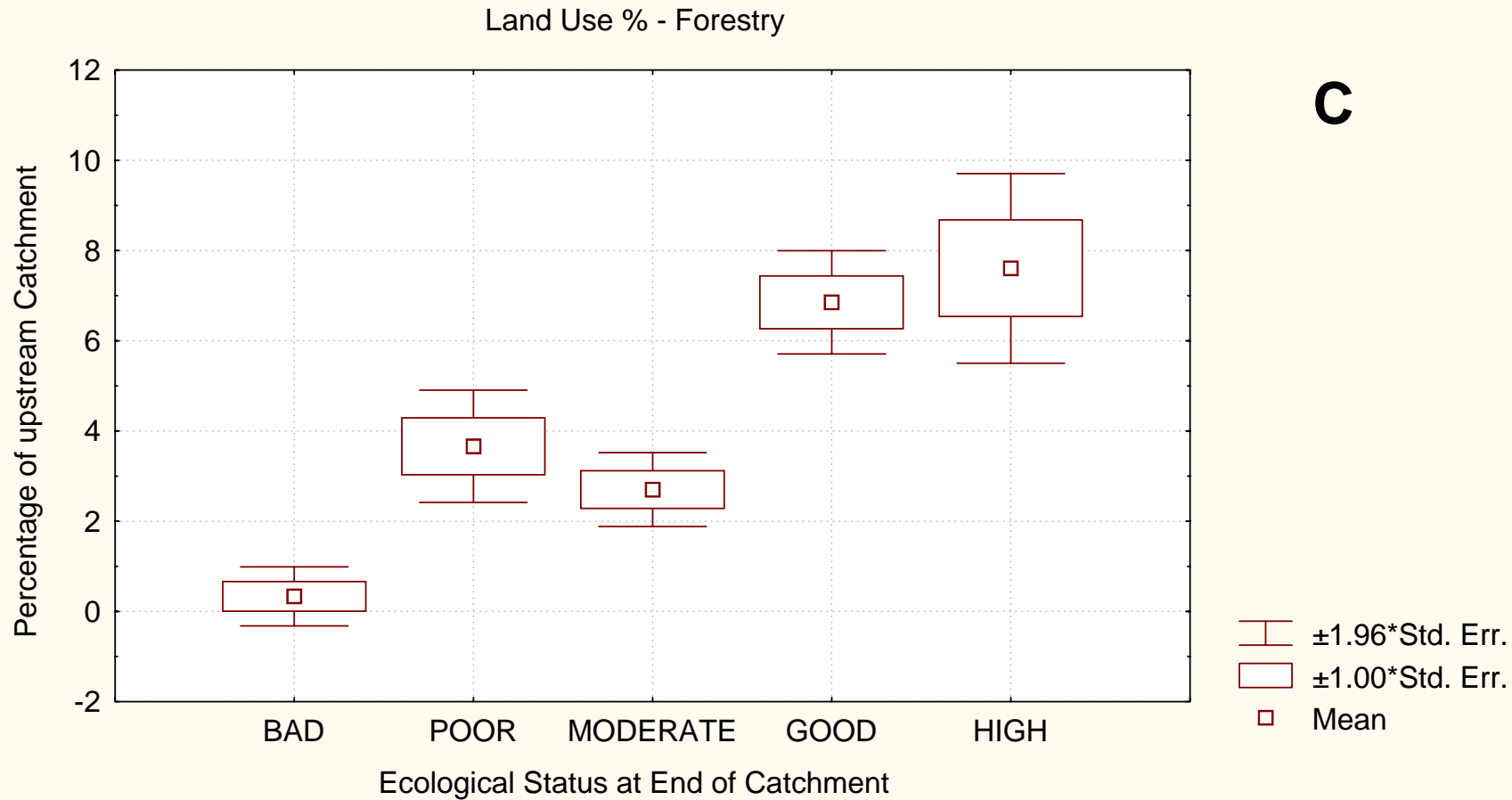
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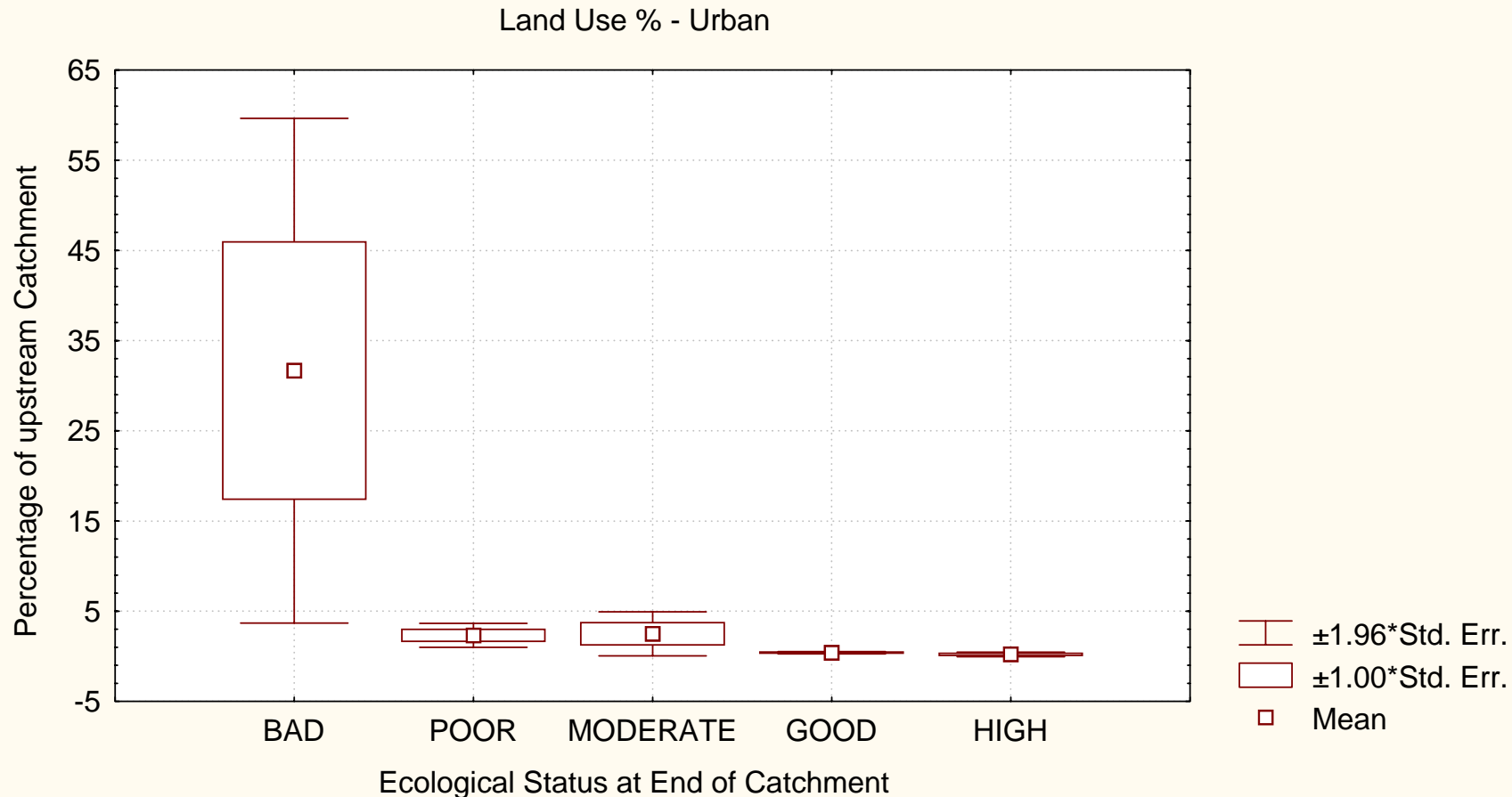
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# Land use v Ecological Status for 508 Independent Catchments



# Land use v Ecological Status for 508 Independent Catchments



# Thresholds for Risk Assessment

- More detailed analysis in Donohue et al 2007 – results used in formal characterisation report as submitted to Brussels.
- Risk Assessment Thresholds for Good Status
  - Pasture – 38% of catchment
  - Tillage – 1.3%
  - Urban – 0.03%

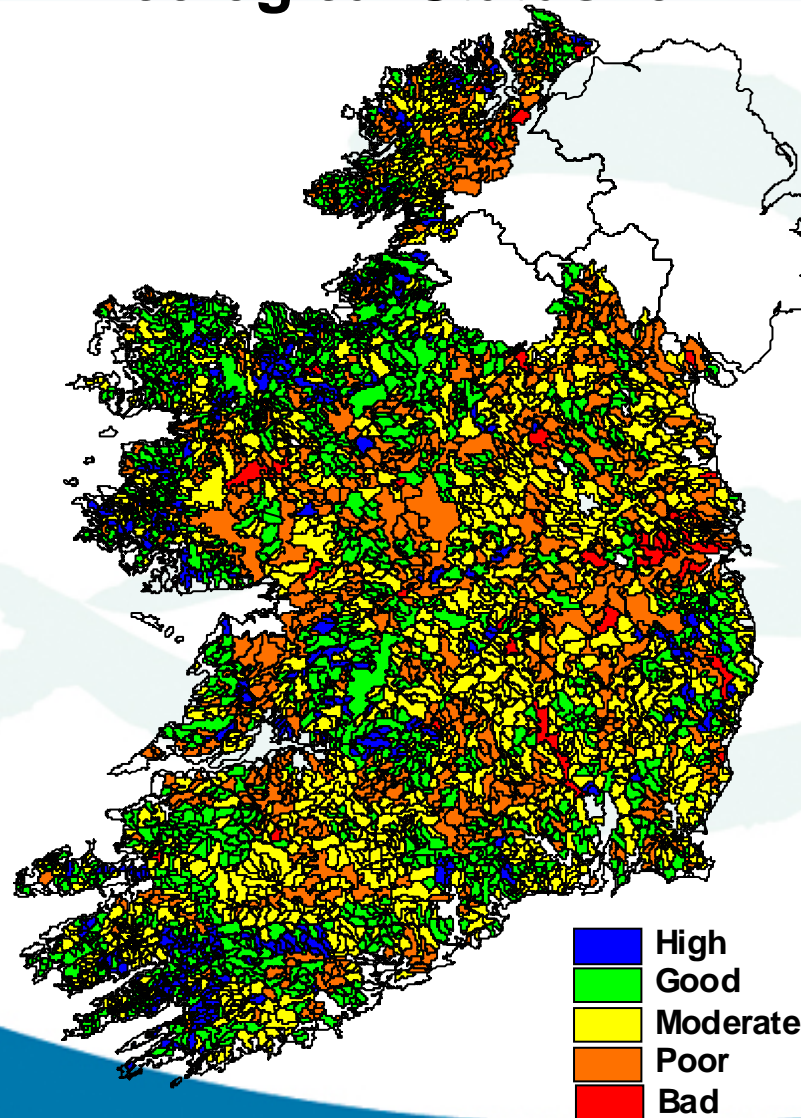
Donohue, I., M. L. McGarrigle, et al. (2006). "Linking catchment characteristics and water chemistry with the ecological status of Irish rivers." Water Research 40(1): 91-98.

# Formal Definition of Ecological Status by EU

- Intercalibration exercise undertaken
- Ireland has intercalibrated with Northern Geographical Intercalibration Group (NGIG) and Central/Baltic GIG
  - e.g. Rivers – macroinvertebrates and phyto-benthos using diatoms
- Imminent EU Decision for a range of biological elements for rivers, lakes, coastal and transitional waters
- New Irish Statutory Instrument due for biological elements plus supporting physico-chemical quality elements and for dangerous substances
- Supporting physico-chemical standards reflect biological status
- Monitoring programme to determine ecological status and chemical status of our waterbodies
- Interim status maps in circulation for draft RBMP – 10 Dec

# Status assessment based on monitoring results

## Interim Ecological Status for Rivers



# River Water Body Interim Ecological Status for RWBs

Status	No.	%
High	485	11%
Good	1598	36%
Moderate	1587	36%
Poor	751	17%
Bad	43	1%
Total	4464	

**OOAO –  
combination  
of pressures  
and Quality  
Elements**

Risk Assessment - diffuse pollution 2004

Number RWBs    % At Risk    Km Affected    % Area of RBDs

2021

45.2

1279

59.8

# Implications for Programme of Measures

- Diffuse Agricultural issues – primarily eutrophication
  - Nitrates Action Programme
    - Nutrient Management Plans, etc
    - Good understanding of how nutrients get from land to water – measures to stem flow of P to water
  - Decoupling human activities from water pollution impacts
  - Basic Measures for SACs will require additional vigilance
- Measures to maintain High and Good Status
  - High status waters are most ‘at risk’
  - Highly sensitive
  - Perhaps even more important to retain High Status water bodies than to restore poor to moderate or low end of Good Status.

**Thank  
You!**

