

The Toxicity and Properties of Amines, Glycols, and Methanol

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Introduction

- Alberta Environment
 - Darlene Howat
 - Gordon Dinwoodie
- Consultants
 - Miles Tindal, Axiom Environmental Inc.
 - Dr. James Sevigny, Iridium Consulting Inc.
- CAPP/PTAC
 - Mike Morden

Project Rationale

- Process chemicals detected in environmental soil samples
- Currently no soil quality guidelines (SQGs) for some of these chemicals
- AENV/PTAC/CAPP project to develop SQGs

Project Overview

- Phase 1 (Sept 2004 – Feb 2005)
 - Literature review and compilation
 - Identify data gaps
- Phase 2
 - Additional toxicity testing
- Phase 3
 - Develop guidelines

Scope of Literature Review

- Background information
- Environmental fate and behaviour
- Toxicity
 - Human and mammalian
 - Terrestrial biota
 - Aquatic biota
- Data gaps

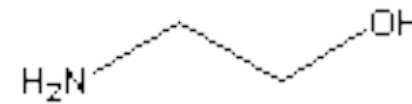
Background

- Gas Sweetening
 - Amines
- Gas Dehydration
 - Glycols
- Hydrostatic Testing
 - Methanol, Glycols
- Hydrate Suppression
 - Methanol

Gas Sweetening Amines

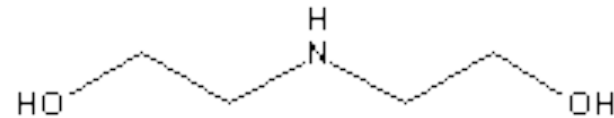
- **Monoethanolamine**

- (MEA)



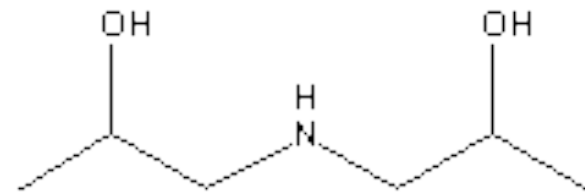
- **Diethanolamine**

- (DEA)



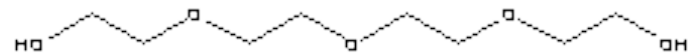
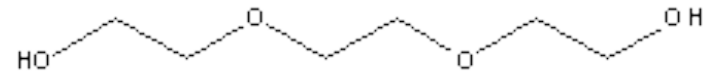
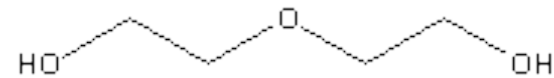
- **Diisopropanolamine**

- (DIPA)



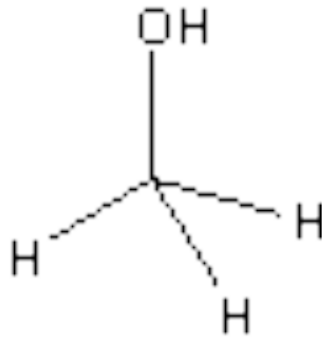
Glycols

- Ethylene Glycol
 - (EG)
- Diethylene Glycol
 - (DEG)
- Triethylene Glycol
 - (TEG)
- Tetraethylene Glycol
 - (TREG)

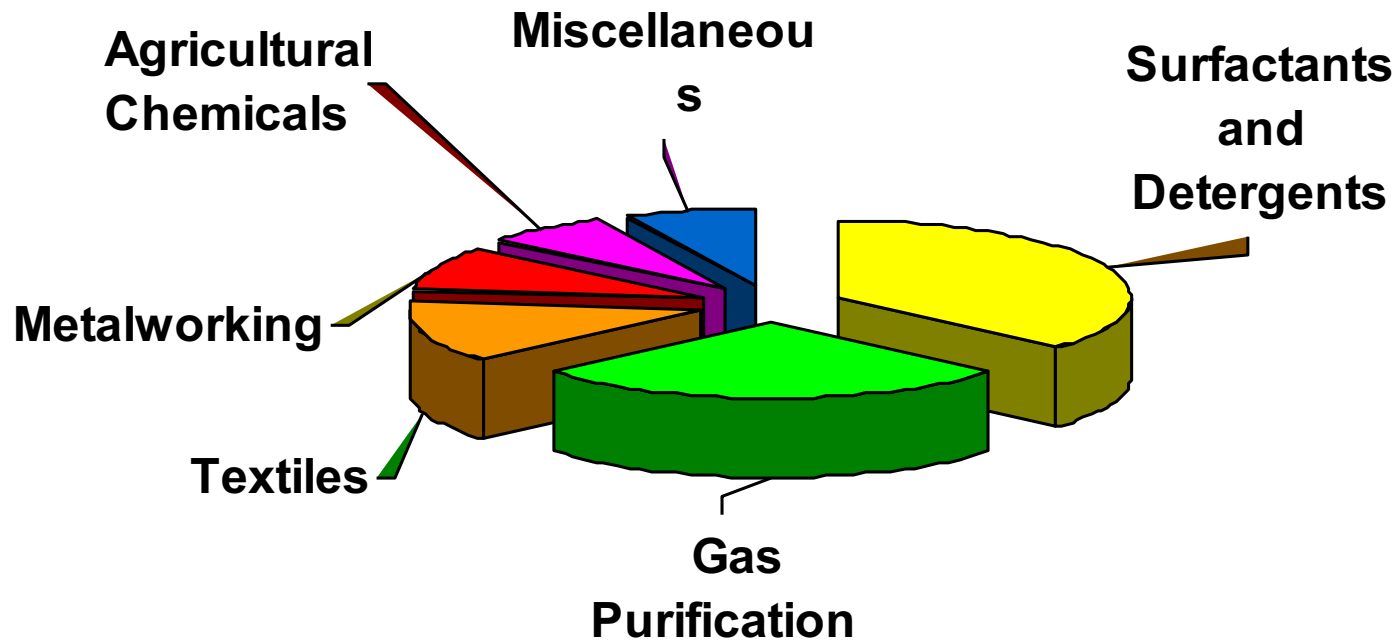


Alcohols

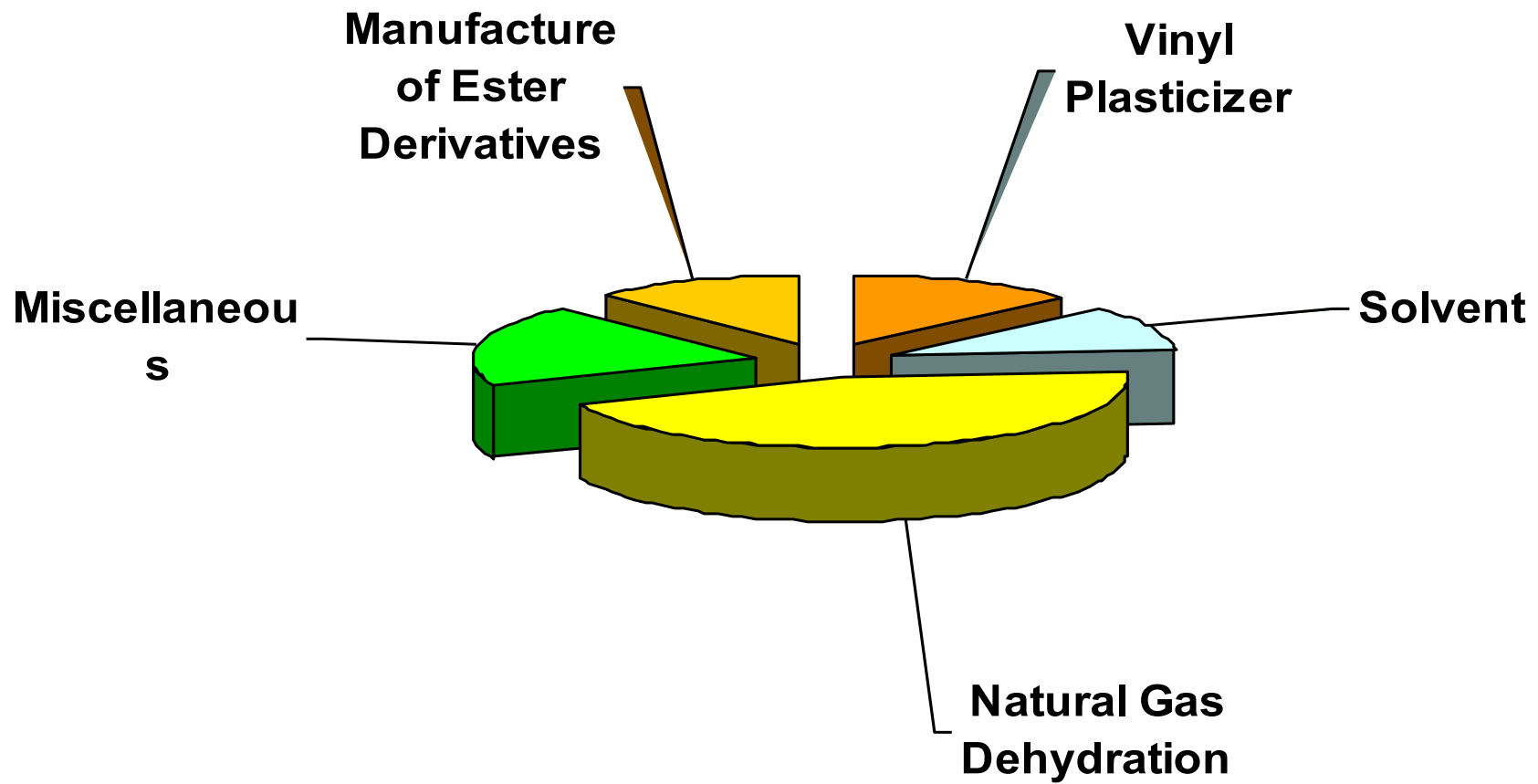
- Methanol



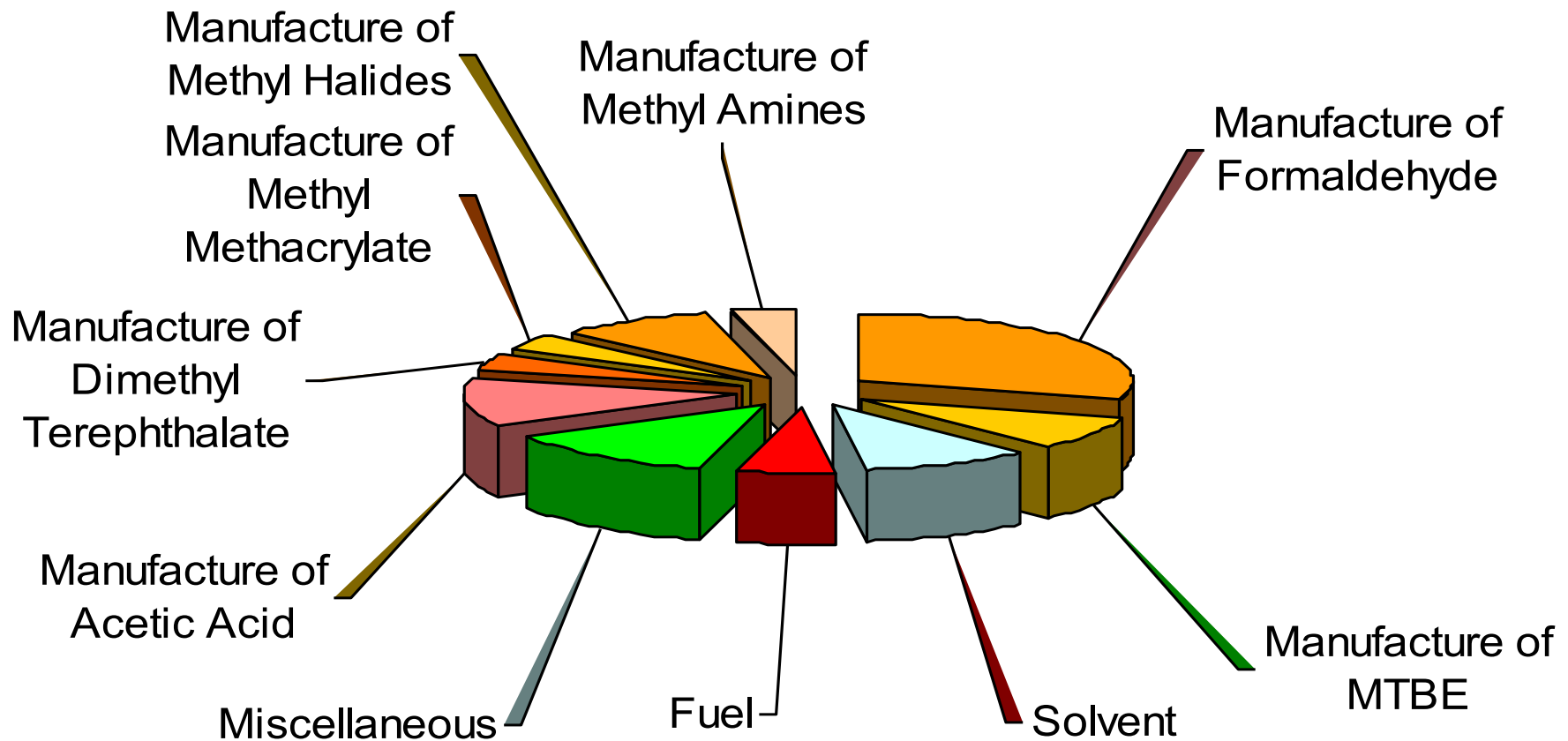
Major Uses of DEA



Major Uses of TEG



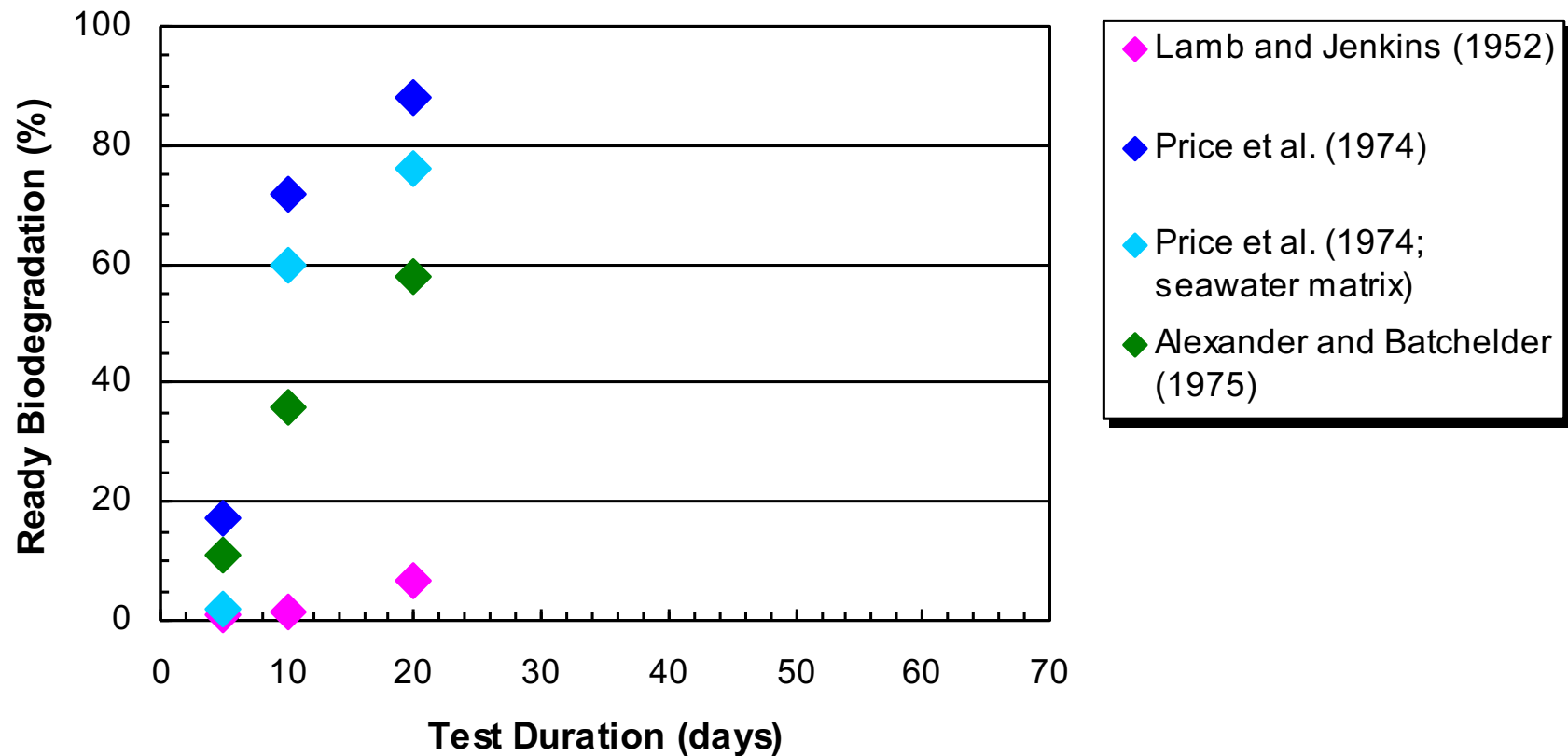
Major Uses of Methanol



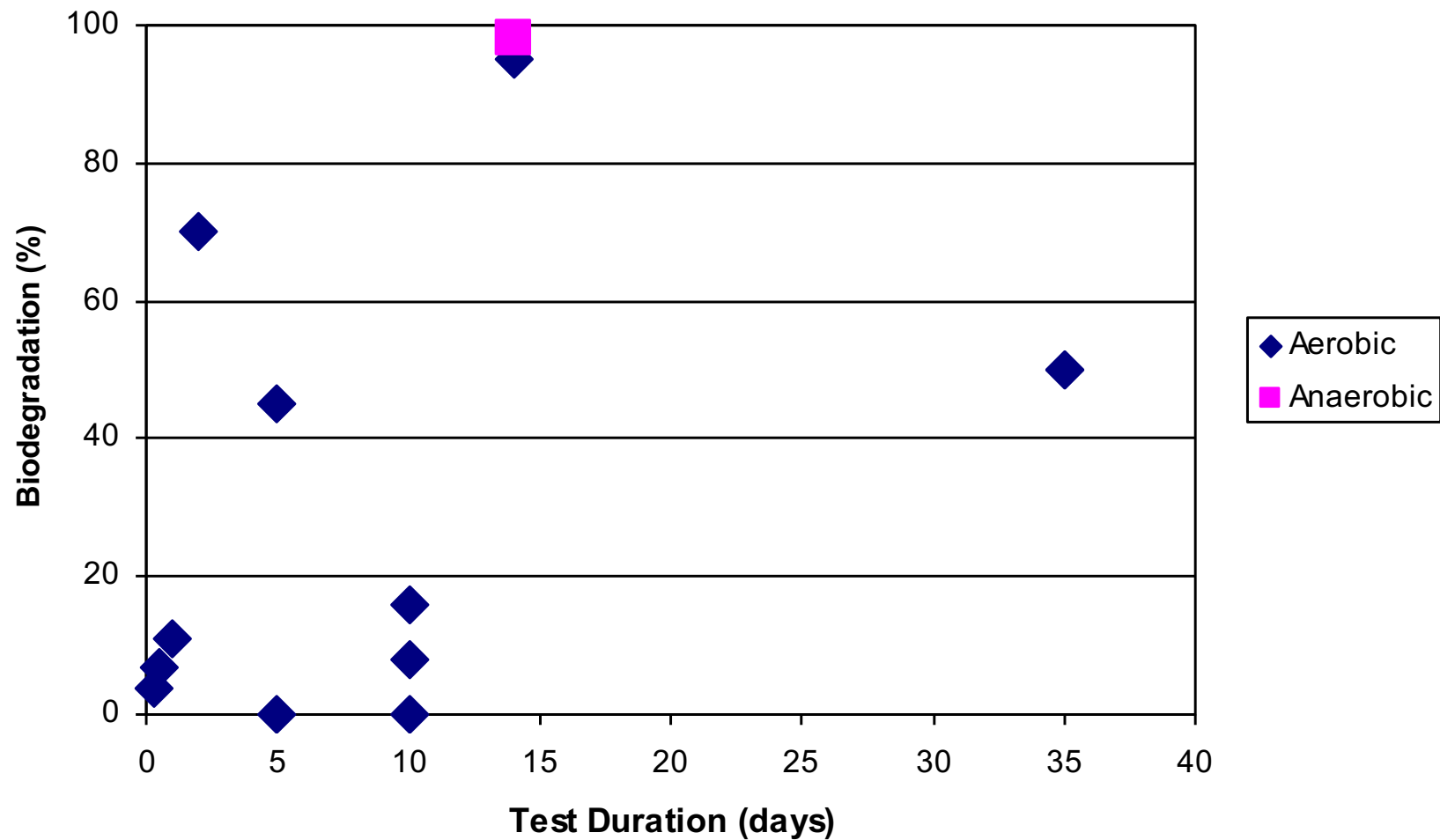
Environmental Fate and Behaviour

	Amines	Glycols	Methanol
Solubility	Miscible	Miscible	Miscible
Groundwater Mobility	Low	High	High
Volatility	Negligible	Negligible	High
Biodegradation Rate	Rapid to Slow	Rapid to Slow	Rapid to Slow

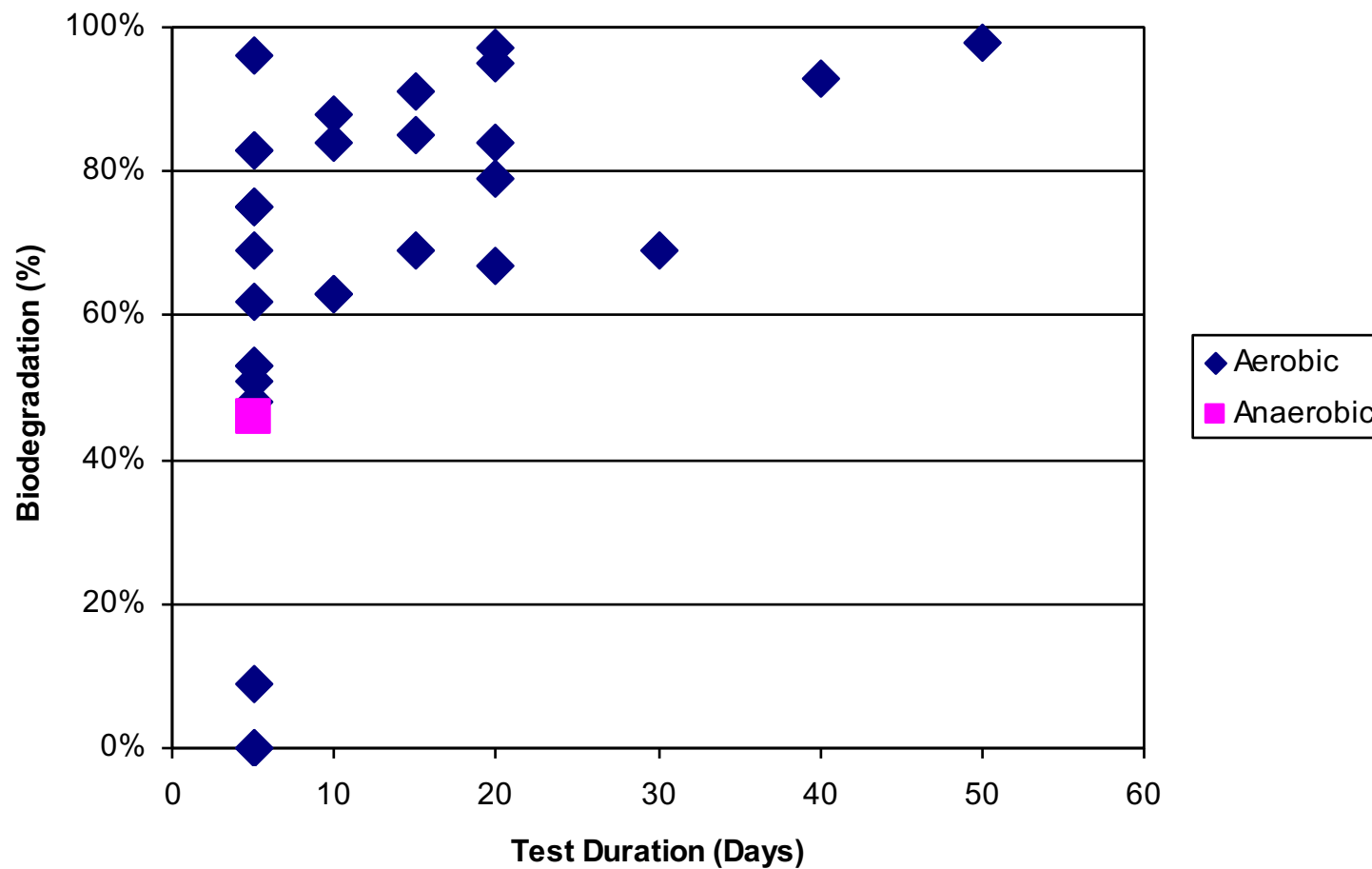
DEA Biodegradation (Microcosm Studies)



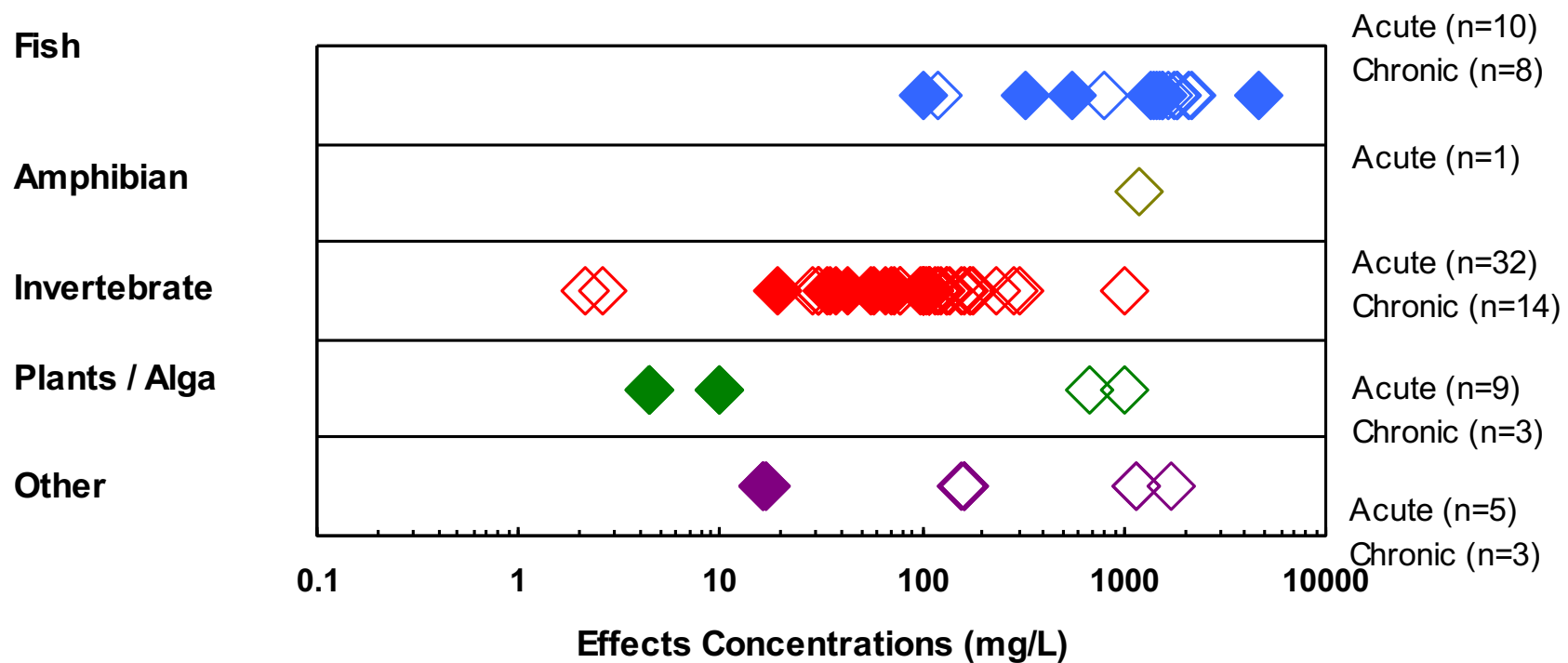
TEG Biodegradation (Microcosm Studies)



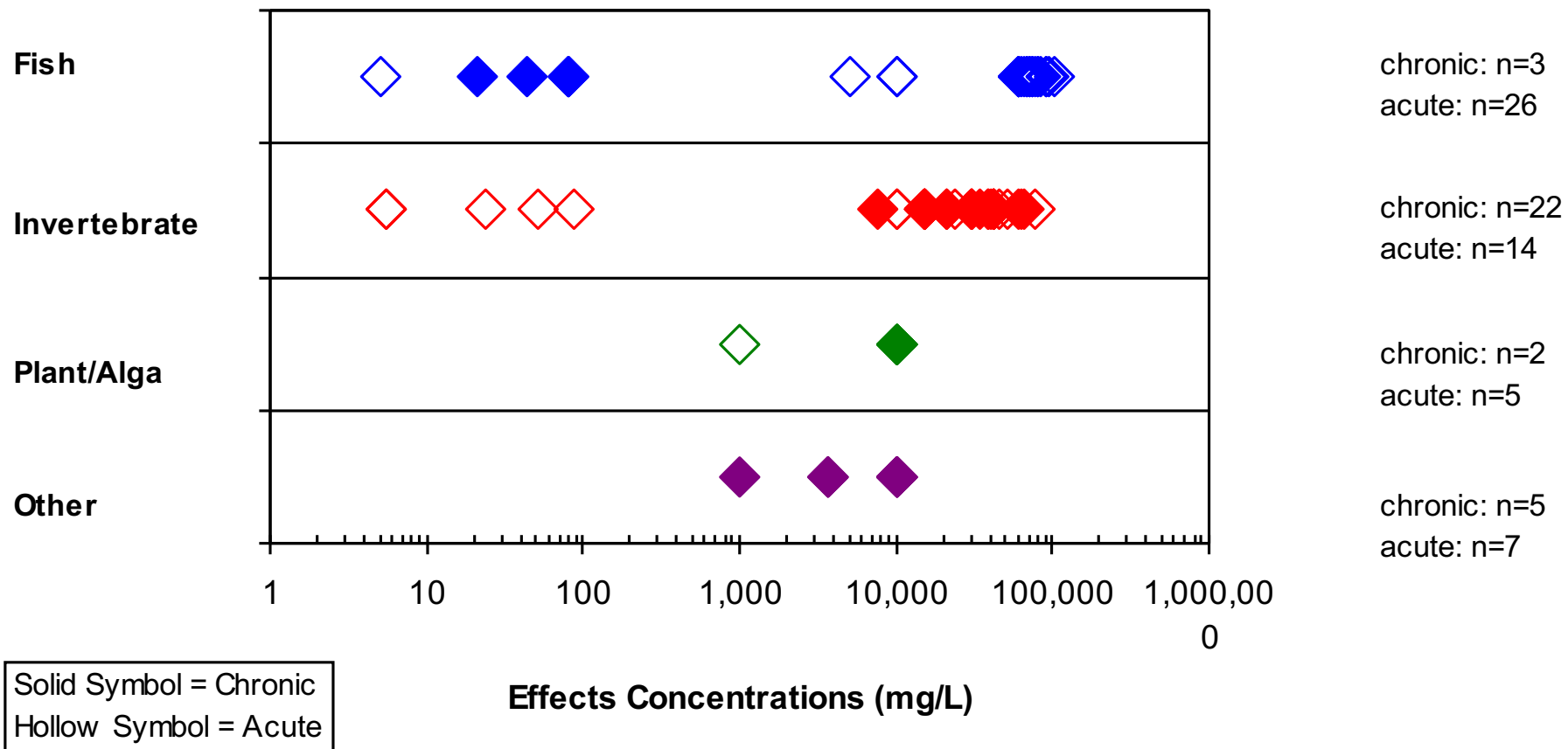
Methanol Biodegradation (Microcosm Studies)



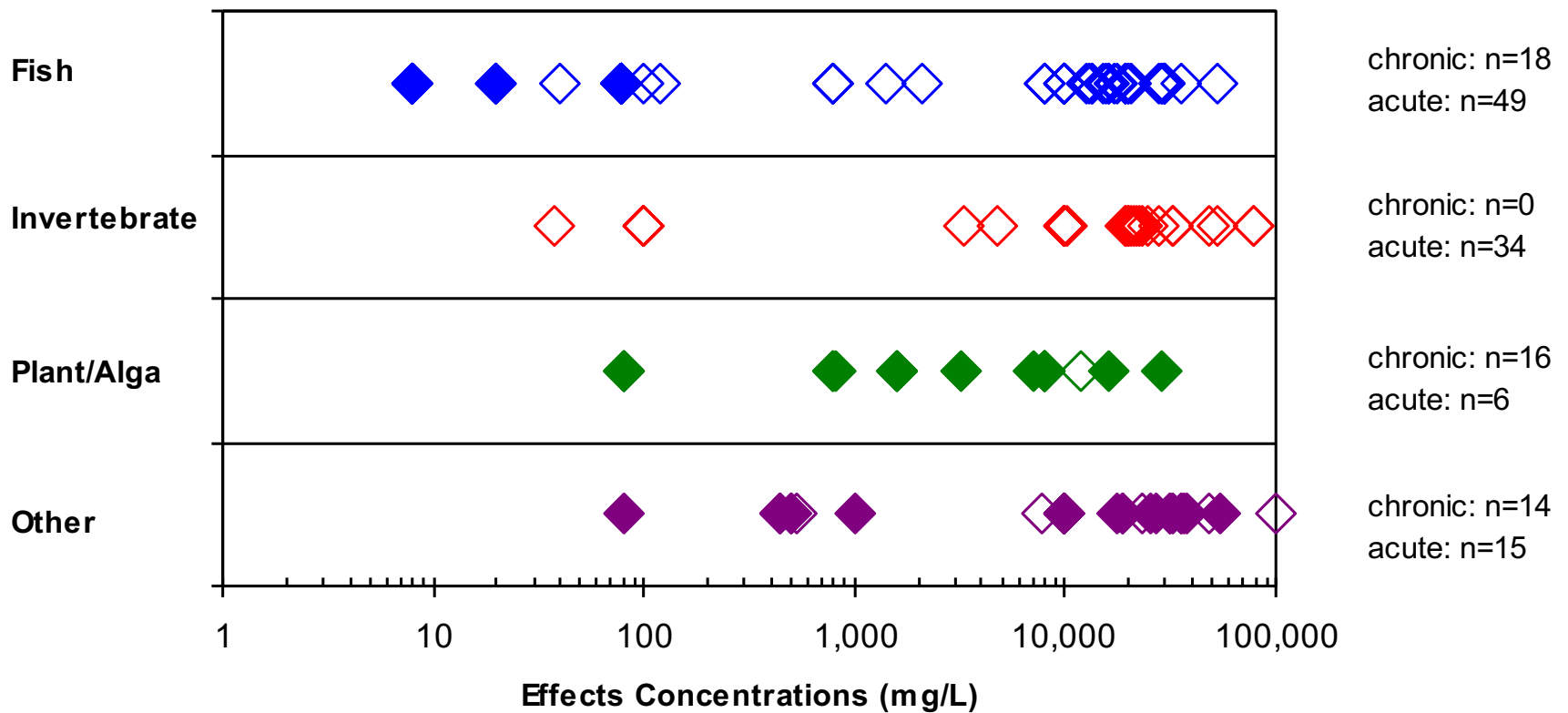
Freshwater Aquatic Toxicity - DEA



Freshwater Aquatic Toxicity - TEG

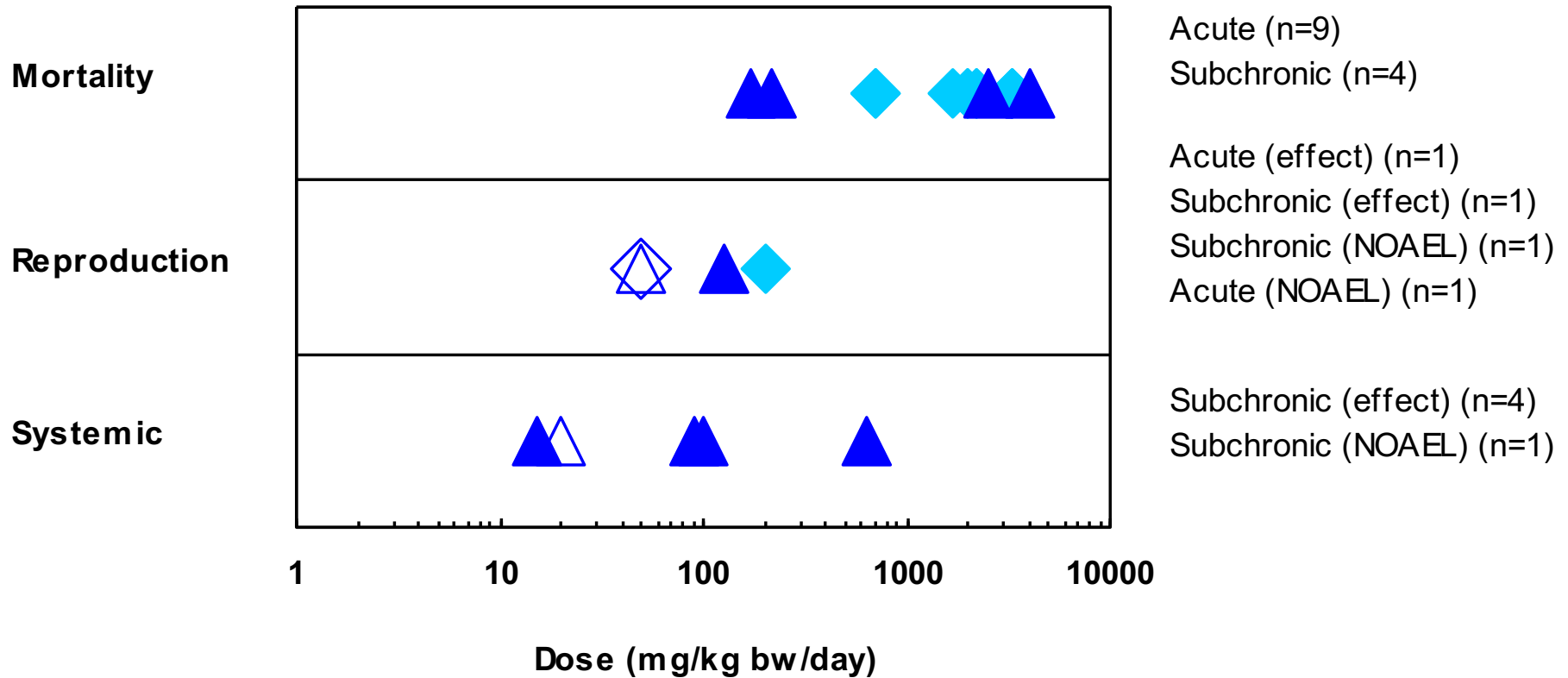


Freshwater Aquatic Toxicity - Methanol



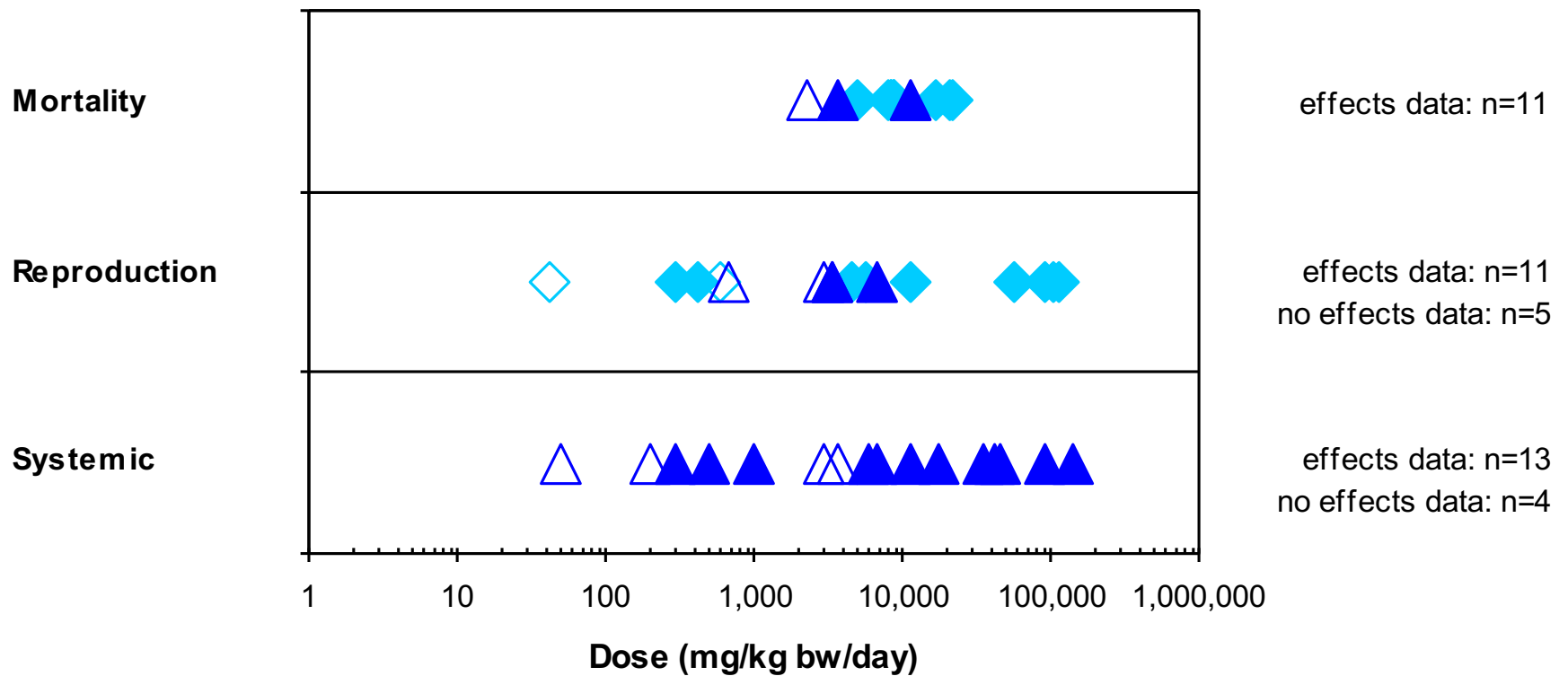
Mammalian Toxicity of DEA

Oral Exposure



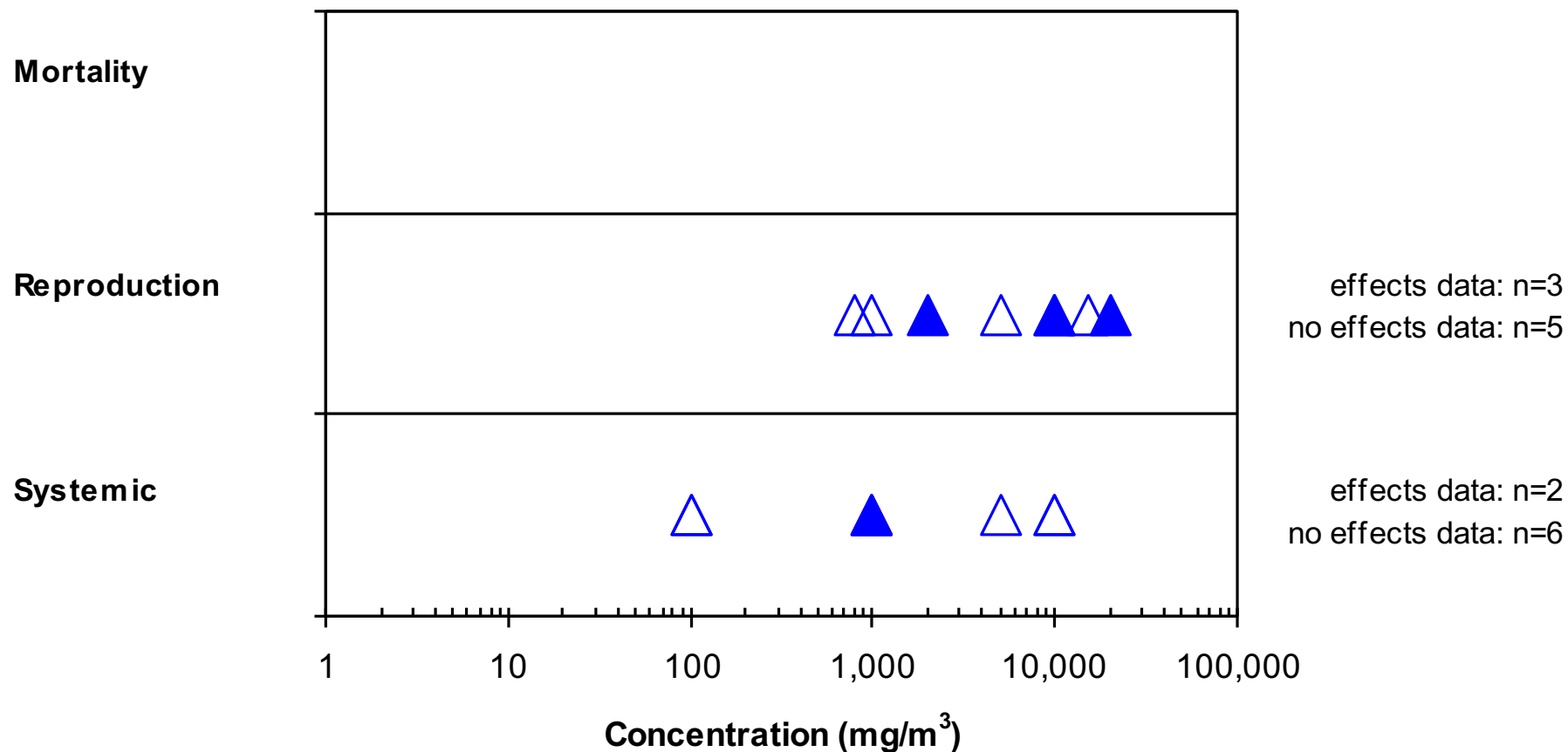
Mammalian Toxicity of TEG

Oral Exposure



Mammalian Toxicity of Methanol

Inhalation Exposure



Summary of Critical Data Gaps

	Additional Studies Required			
	Terrestrial		Freshwater Aquatic	
	Plant	Invertebrate	Fish	Invertebrate
MEA	3	2	-	1
DEA	3	2	1	-
DEG	3	2	2	2
TEG	3	2	-	1
TREG	3	2	2	2
Methanol	3	2	-	-

Next Steps

- Phase 2
 - Identify toxicity test providers/costs
 - Set priorities
 - Conduct selected toxicity tests
- Phase 3
 - Develop soil quality guidelines