

Appendix E

Exceedances of NYSDEC Sediment Quality Values

APPENDIX E. EXCEEDANCES OF NYSDEC SEDIMENT QUALITY VALUES

This appendix provides figures comparing concentrations of contaminants detected in surface sediments collected in 1992 and 2000 with New York State Department of Environmental Conservation (NYSDEC) sediment quality screening criteria (NYSDEC, 1999). The 1992 event examined samples taken from the upper 2 cm (0 to 2 cm) of the sediments throughout the lake. The 2000 sampling concentrated on the more heavily contaminated areas within the lake and examined samples from the upper 15 cm (0 to 15 cm) of the lake surface which is considered to be the biologically active zone. Since the 0 to 15 cm interval was not collected in 1992, the 1992 and 2000 surface sediment data sets were not combined, and the data are compared separately to the NYSDEC screening criteria.

NYSDEC sediment quality screening criteria were developed for two classes of contaminants: metals and non-polar organic contaminants. Figures E-1 to E-12 show locations where concentrations of metals detected in Onondaga Lake surface sediments exceed NYSDEC sediment screening criteria. Metals screening criteria were derived from Ministry of Ontario (MOE) guidelines (Persaud et al., 1993) and National Oceanic and Atmospheric Administration (NOAA) data (Long and Morgan, 1990) that make use of the screening-level approach. This methodology measures the concentration of contaminants present in areas where ecological impacts have been noted, and correlates the contaminant concentration with the severity of the impact (see Appendix D, Table D-109 for screening criteria).

For metals concentrations in sediments, two levels of risk have been established: the Lowest Effect Level (LEL) and the Severe Effect Level (SEL). The LEL for each metal is the lowest of either the Persaud et al. (1993) LEL or the Long and Morgan (1990) Effects Range-Low (ER-L). Similarly, the SEL for each metal is the lowest of either the Persaud et al. (1993) SEL or the Long and Morgan (1990) Effects Range-Median (ER-M). The ER-L is the lower 10 percentile in chemical data associated with biological effects and the ER-M is the median. The LEL is derived from the 5th percentile screening level concentration (SLC), which is the highest level of a contaminant that can be tolerated by 95 percent of the benthic infaunal species exposed. The SEL is derived from the 95th percentile SLC, which is the highest level of a contaminant that can be tolerated by 5 percent of the benthic infaunal species exposed.

Non-polar organic contaminant criteria were derived using the equilibrium partitioning approach, endorsed by the US Environmental Protection Agency (USEPA) Science Advisory Board (SAB). This approach estimates the biological impacts that a contaminant may cause based on its affinity to sorb to organic carbon in the sediment. The concentration of biologically available contaminant is predicted and related to potential toxicity and bioaccumulation by using existing criteria established for the water column. New York State water quality standards and guidance values were used to derive sediment screening criteria (see Appendix D, Table D-110 for criteria). USEPA water quality criteria were used only when New York State has not published a standard or guidance value for a particular compound. Water quality criteria for bioaccumulation proposed by the Divisions of Fish and Wildlife and Marine Resources were used when no New York State water quality standard

or guidance value for bioaccumulation has been developed. Figures E-13 to E-54 show locations where concentrations of organic contaminants detected in Onondaga Lake sediments exceed available benthic aquatic life acute toxicity sediment screening criteria, benthic aquatic life chronic toxicity sediment screening criteria, and wildlife bioaccumulation sediment screening criteria. A total organic carbon value of 1 percent was used to convert the screening criteria to a dry-weight basis for comparison to the dry-weight analytical data. The screening values shown on the figures are in dry-weight.

References

- Long, E.R. and L.G. Morgan. 1990. The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program. NOAA Technical Memorandum, NOS OMA 64. National Oceanic and Atmospheric Administration, Seattle, WA.
- New York State Department of Environmental Conservation (NYSDEC). 1999. Technical Guidance for Screening Contaminated Sediments. New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources. Albany, NY.
- Persaud, D., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. Ontario Ministry of the Environment, Water Resources Branch.

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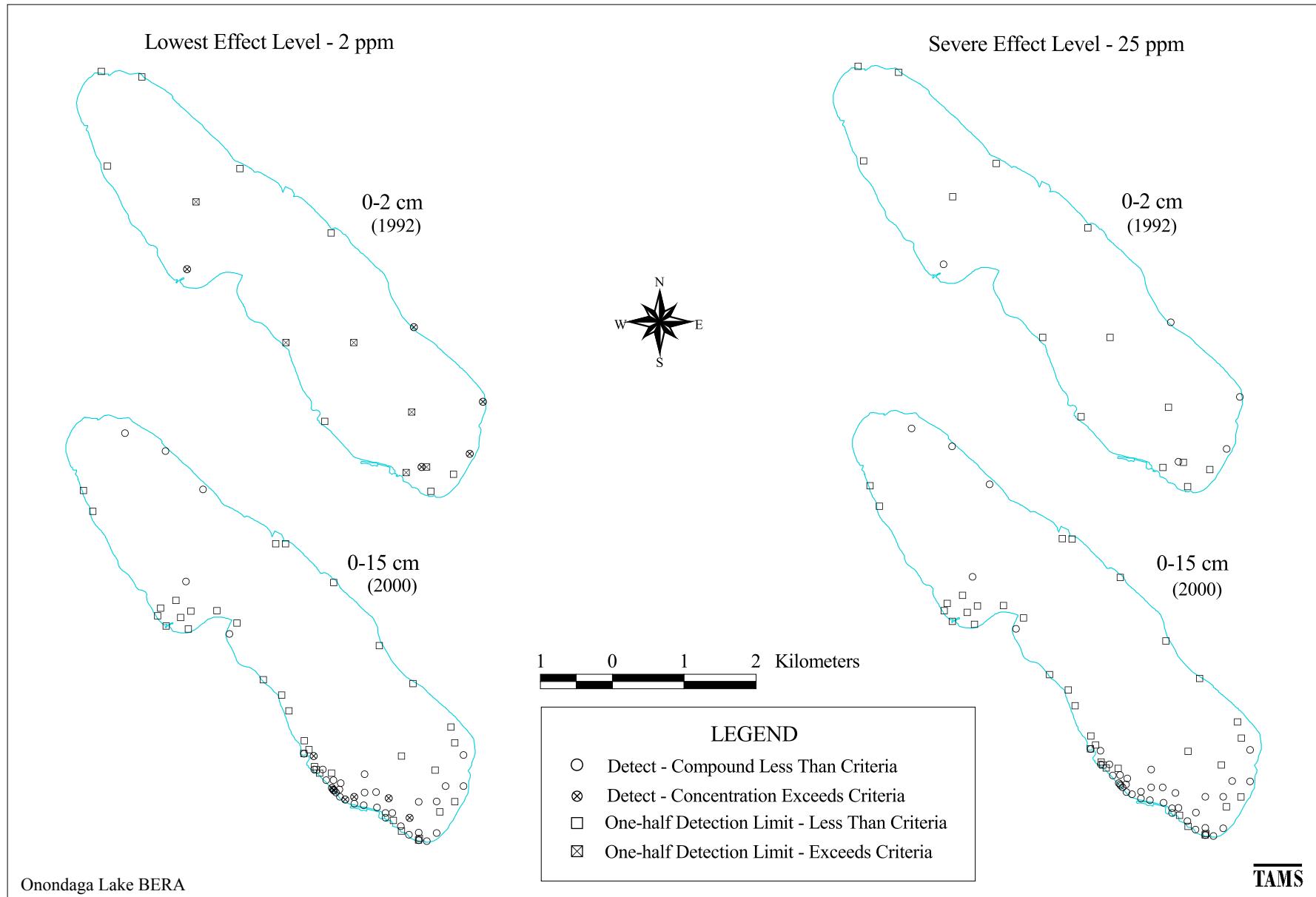


Figure E-1
Comparison of Antimony Sediment Concentrations with NYSDEC Screening Criteria

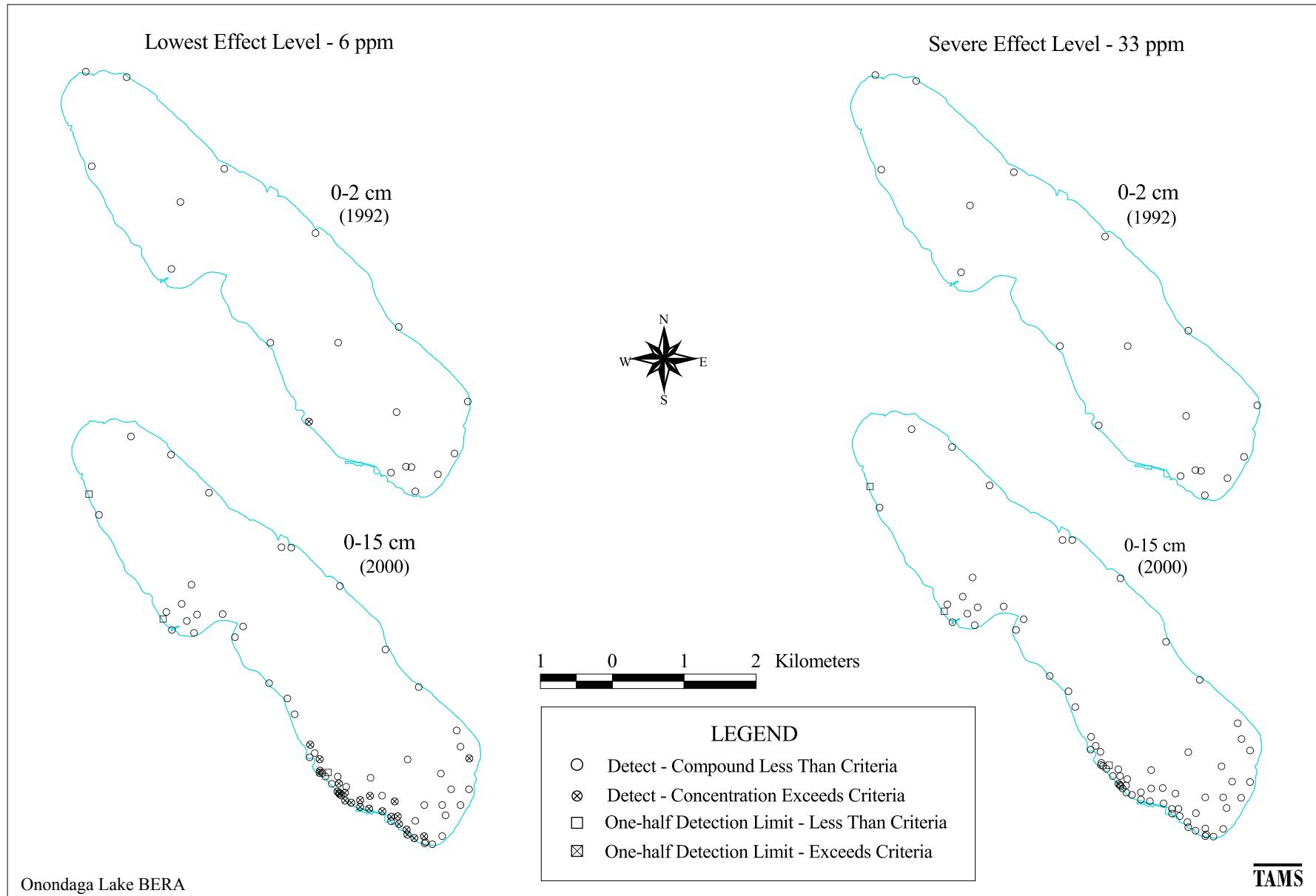


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Comparison of Arsenic Sediment Concentrations with NYSDEC Screening Criteria

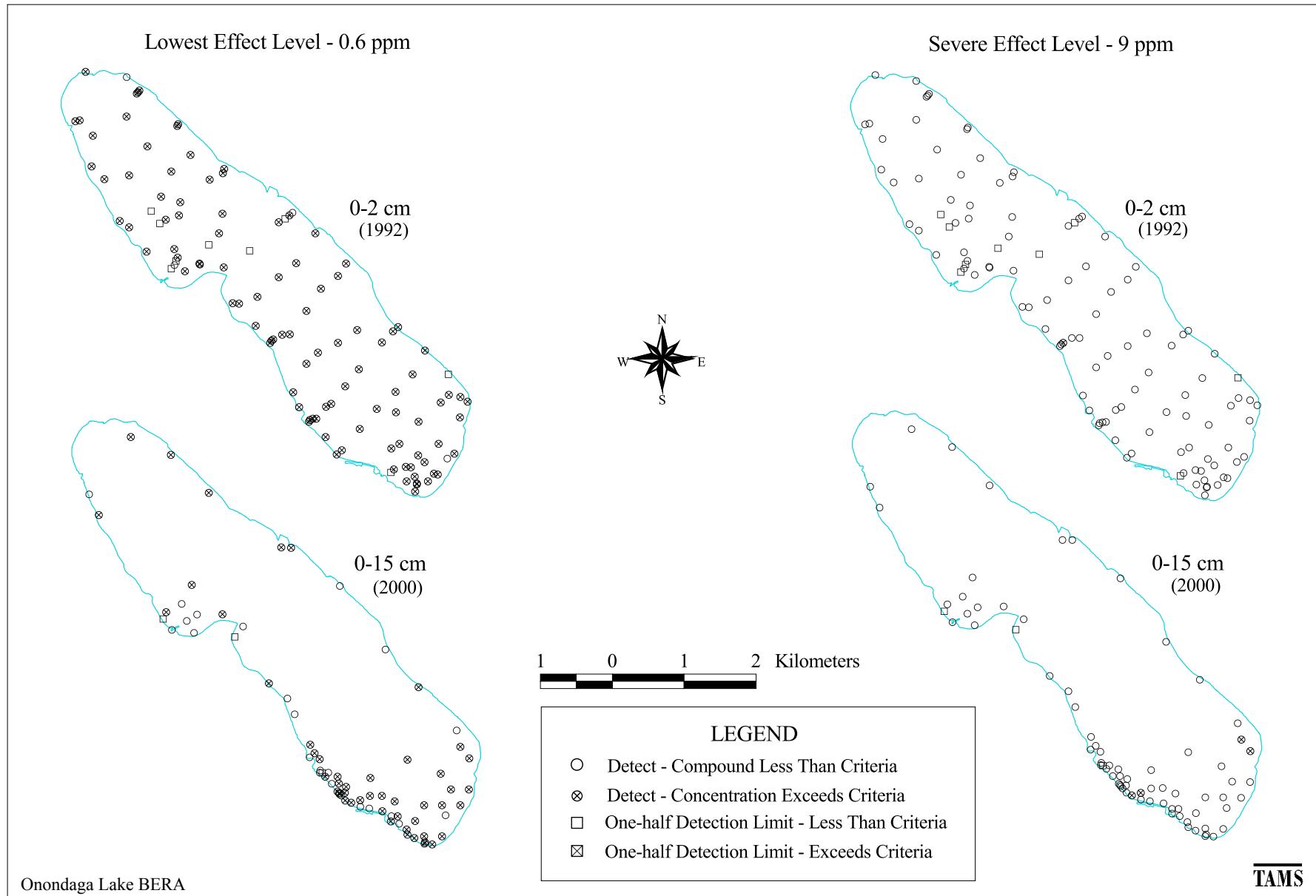


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Comparison of Cadmium Sediment Concentrations with NYSDEC Screening Criteria

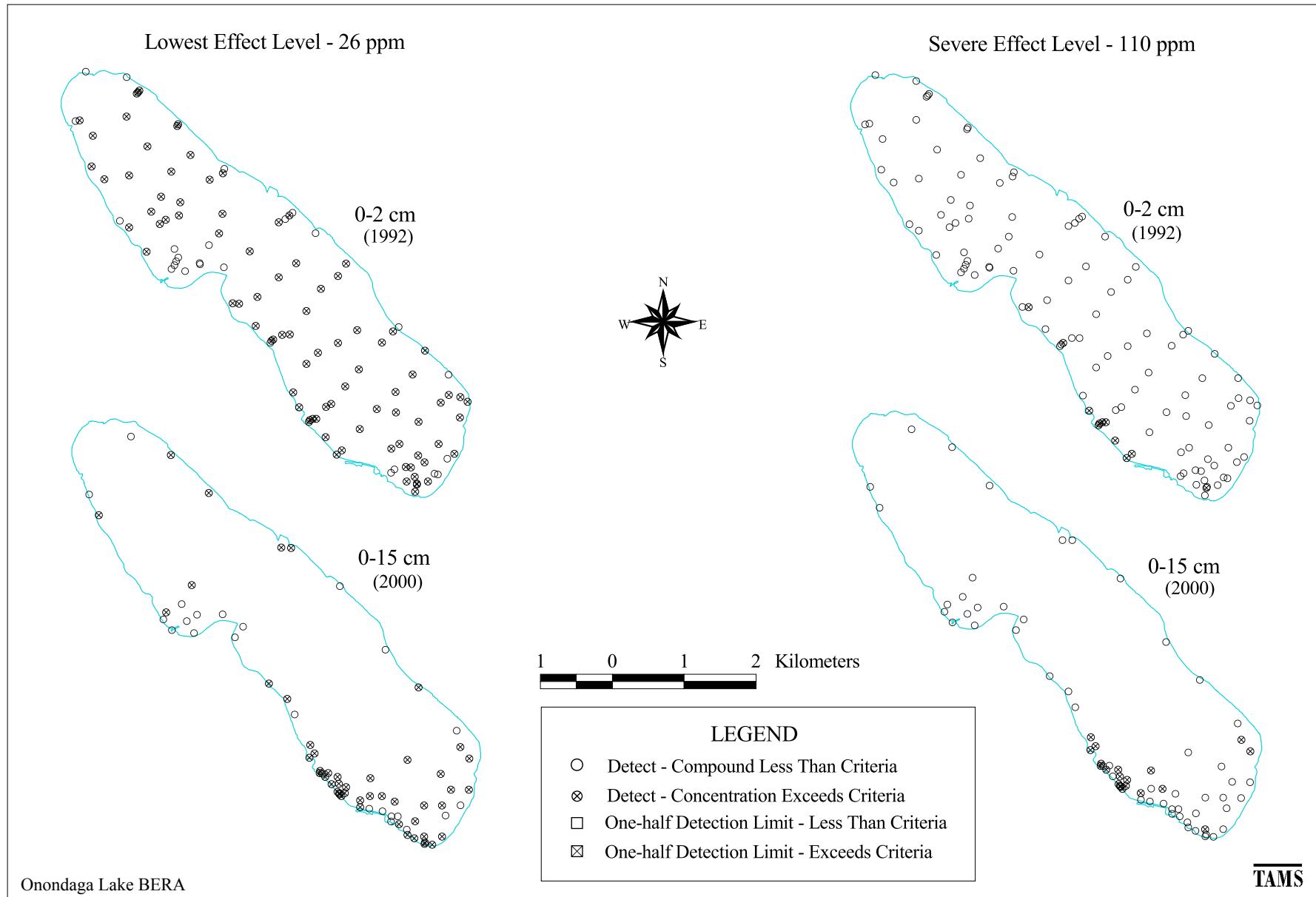


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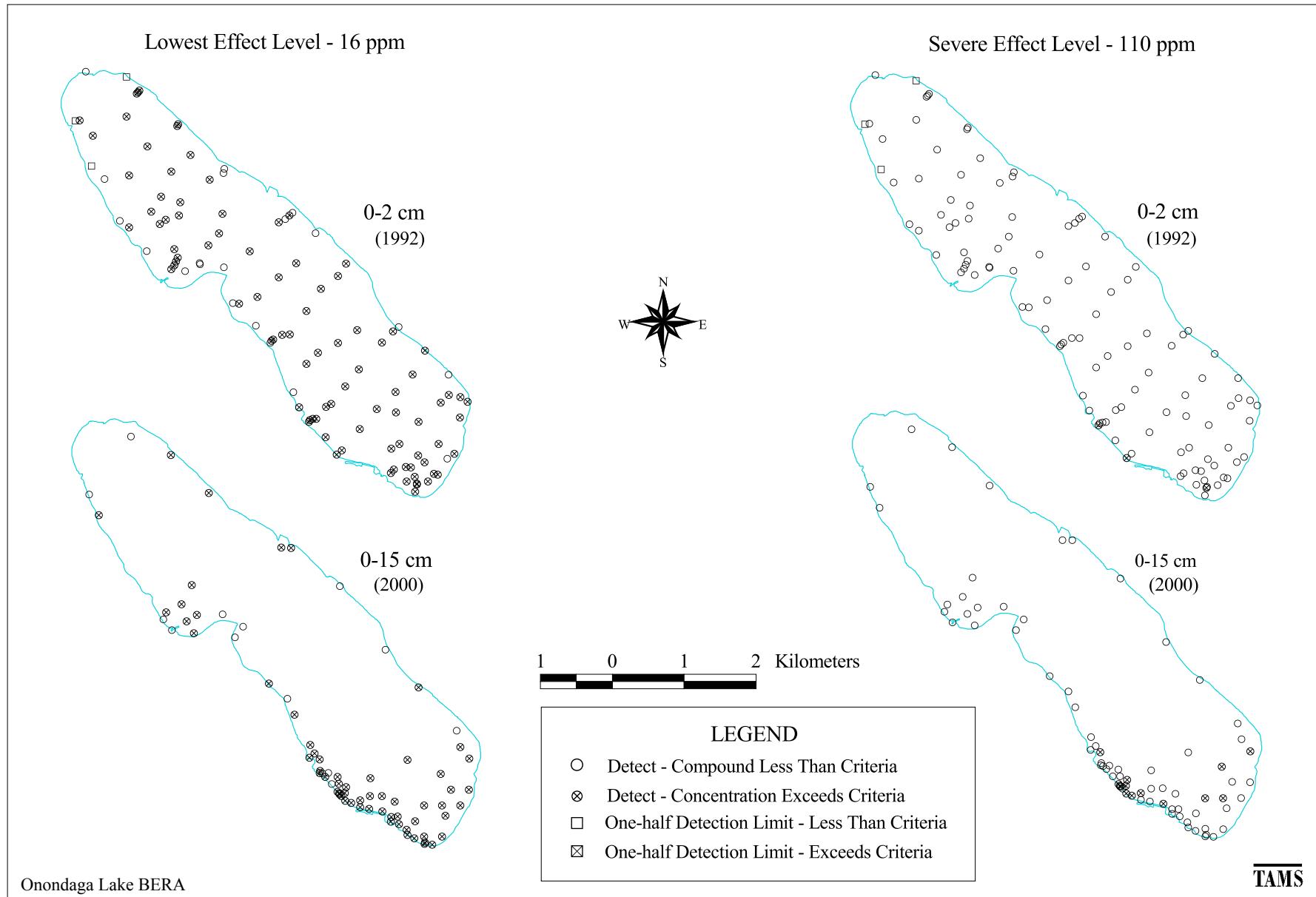


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Comparison of Copper Sediment Concentrations with NYSDEC Screening Criteria

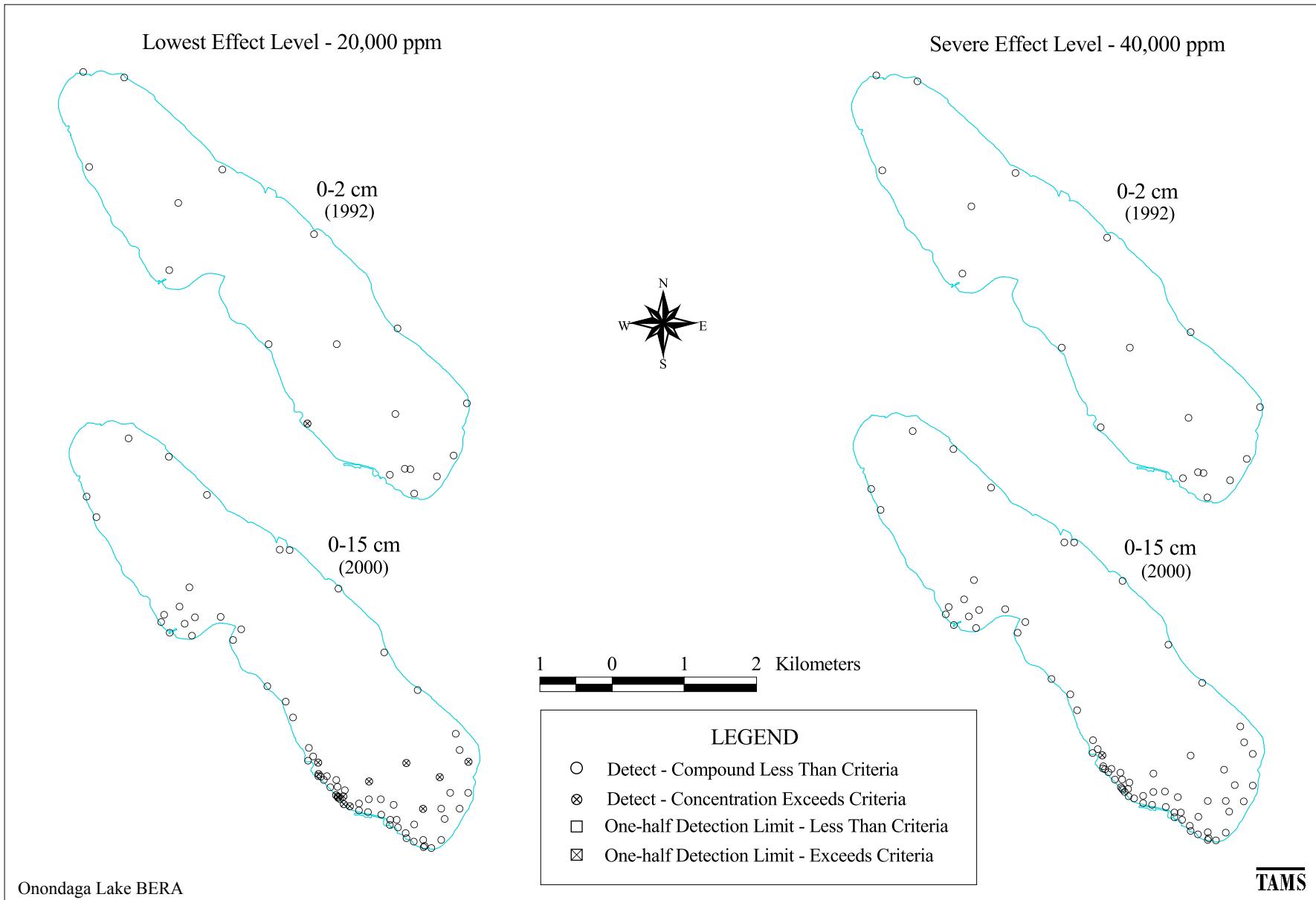


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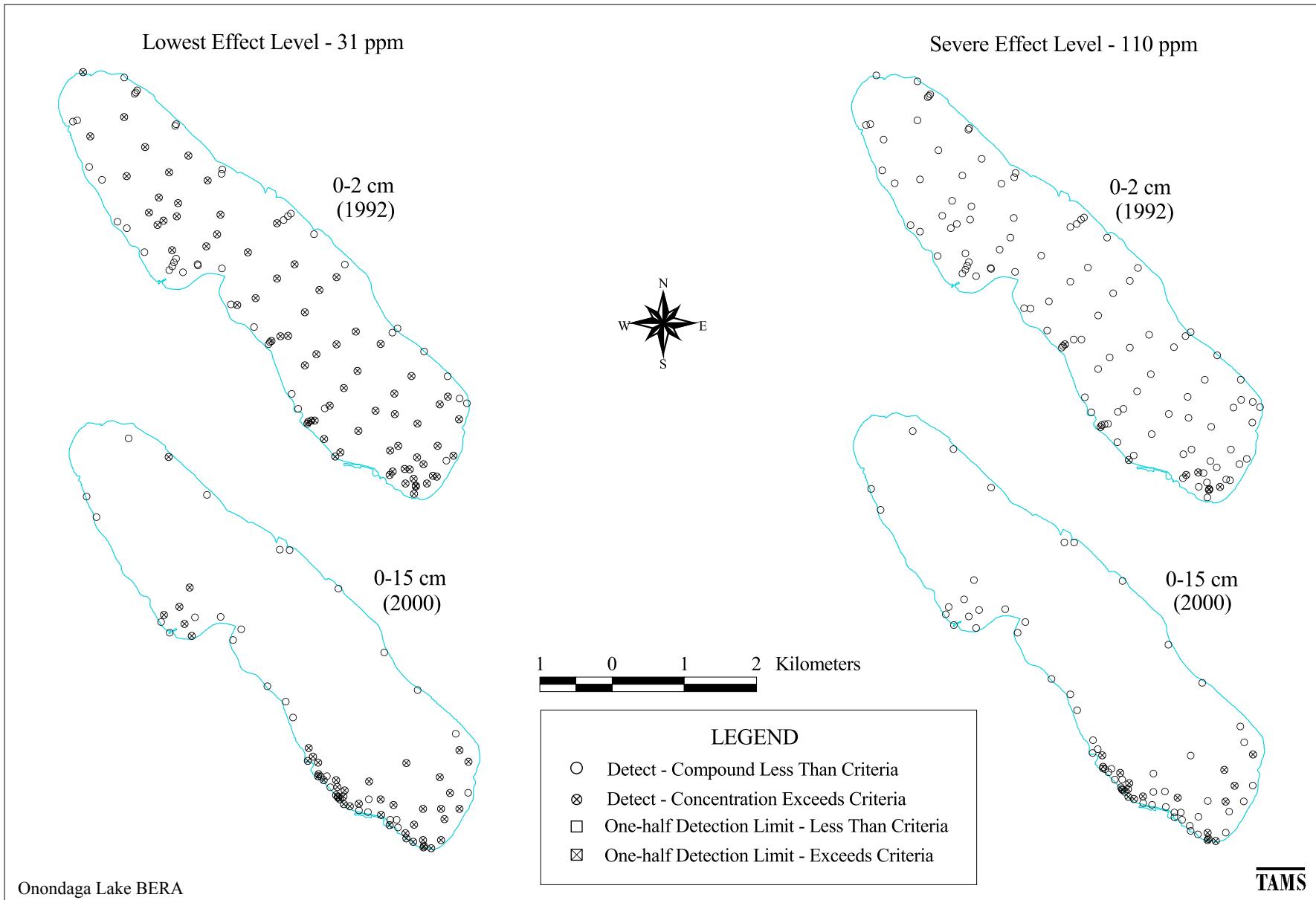


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Comparison of Lead Sediment Concentrations with NYSDEC Screening Criteria

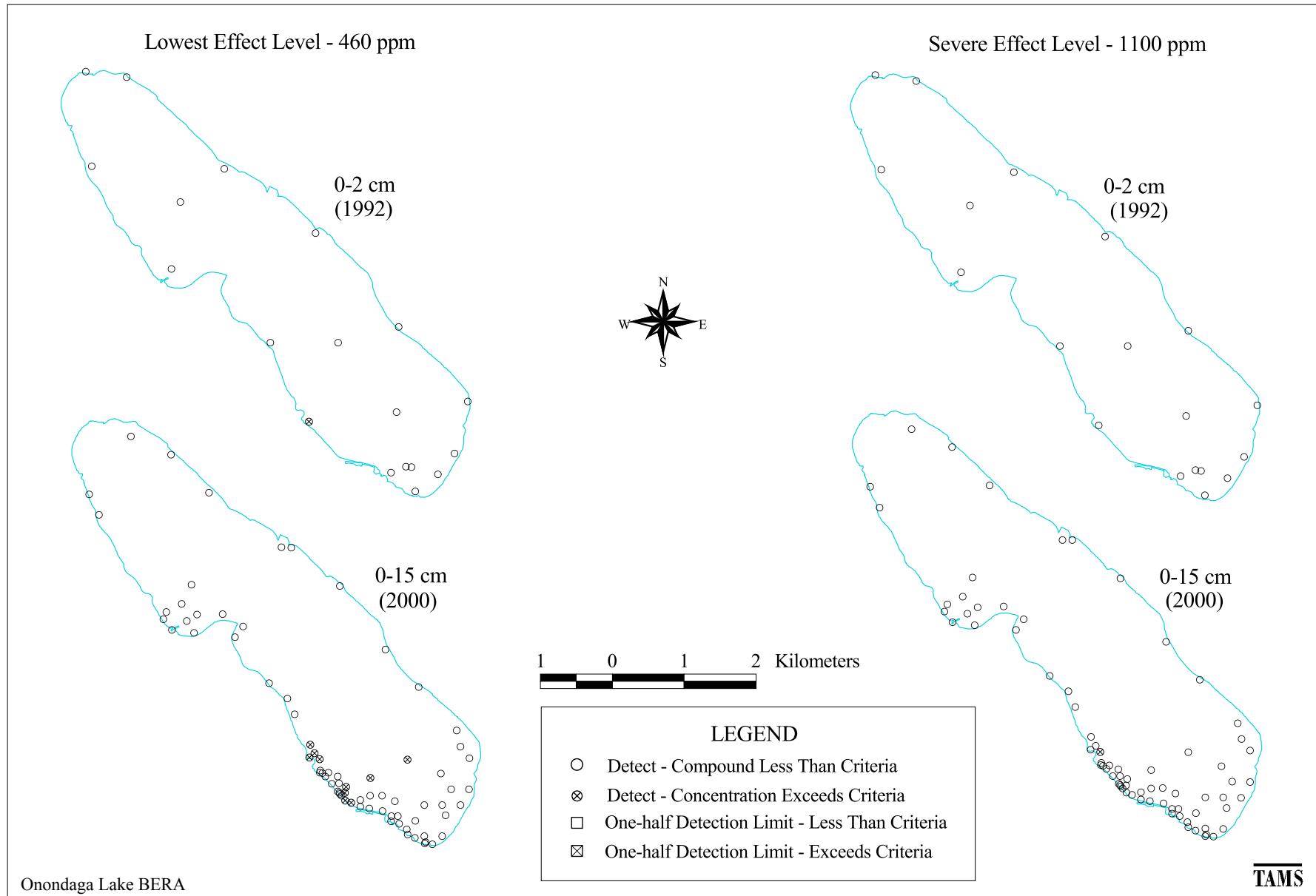


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Comparison of Manganese Sediment Concentrations with NYSDEC Screening Criteria

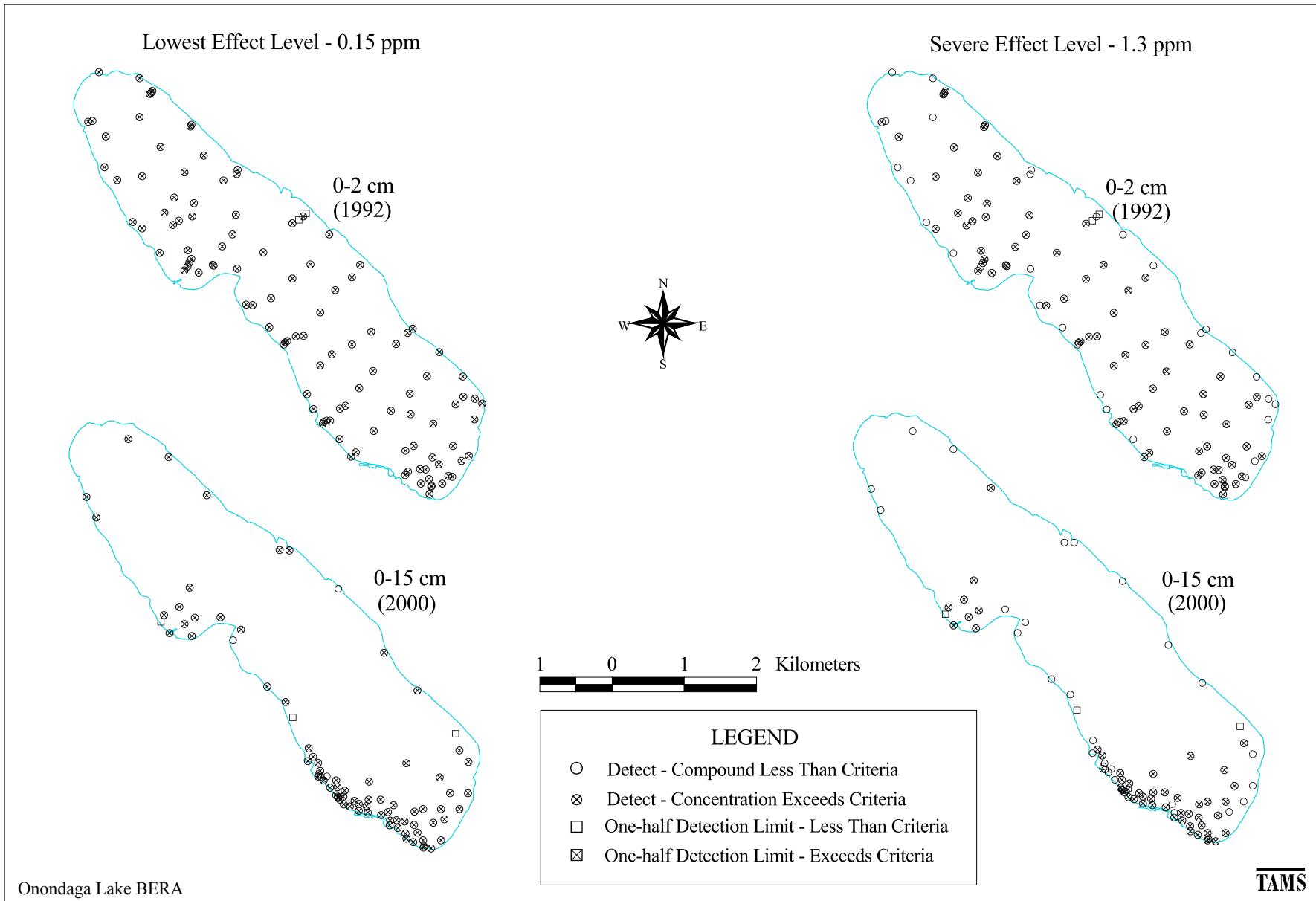


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Comparison of Mercury Sediment Concentrations with NYSDEC Screening Criteria

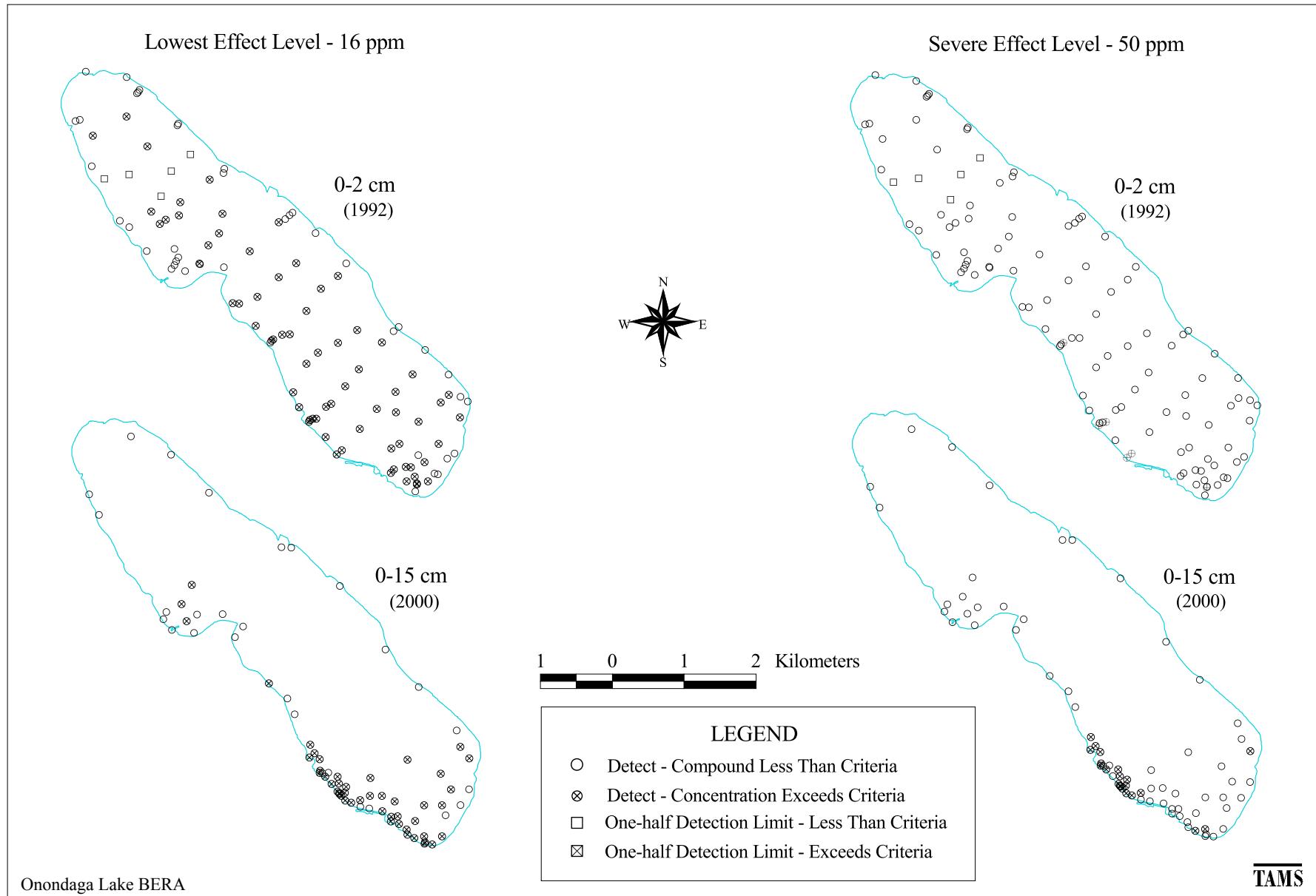


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Comparison of Nickel Sediment Concentrations with NYSDEC Screening Criteria

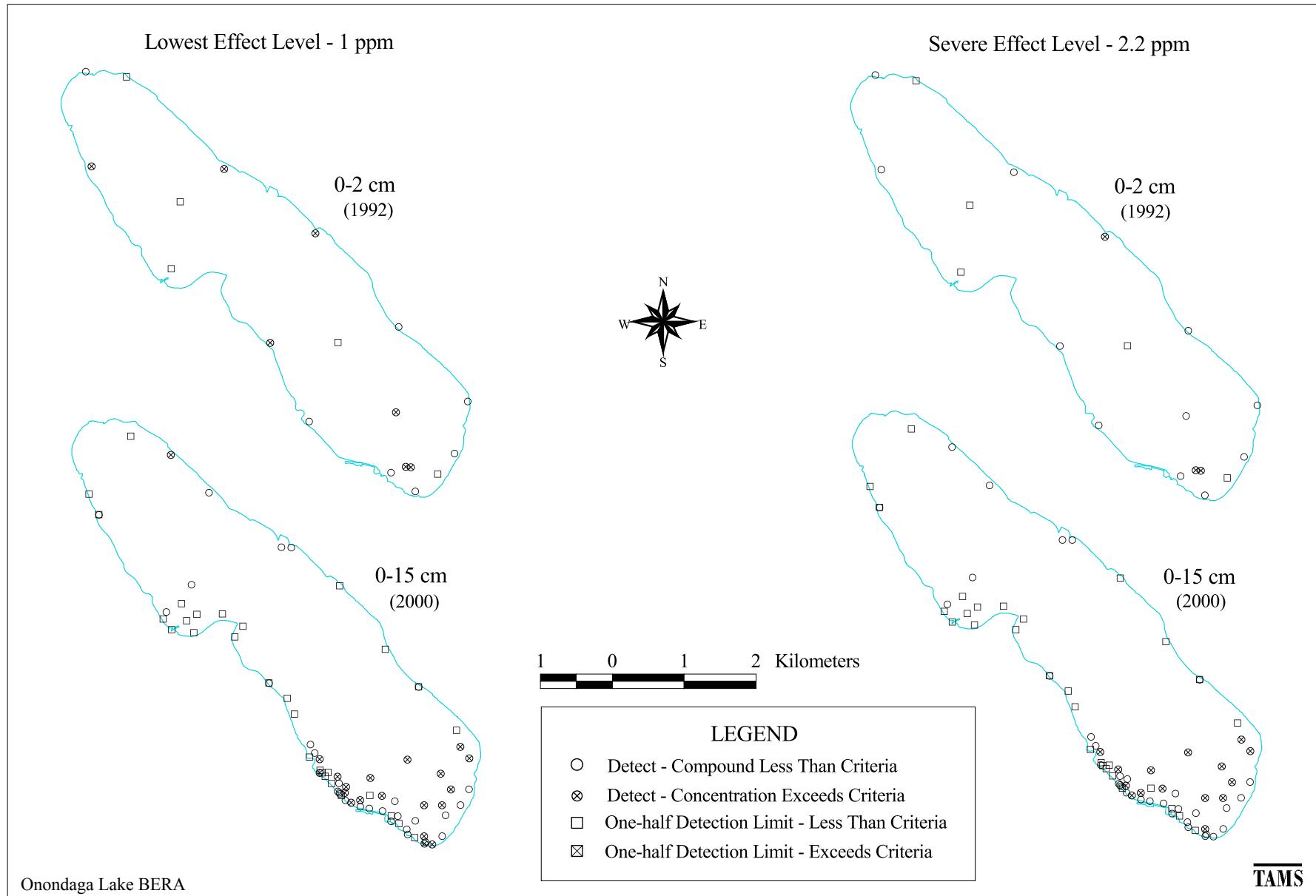


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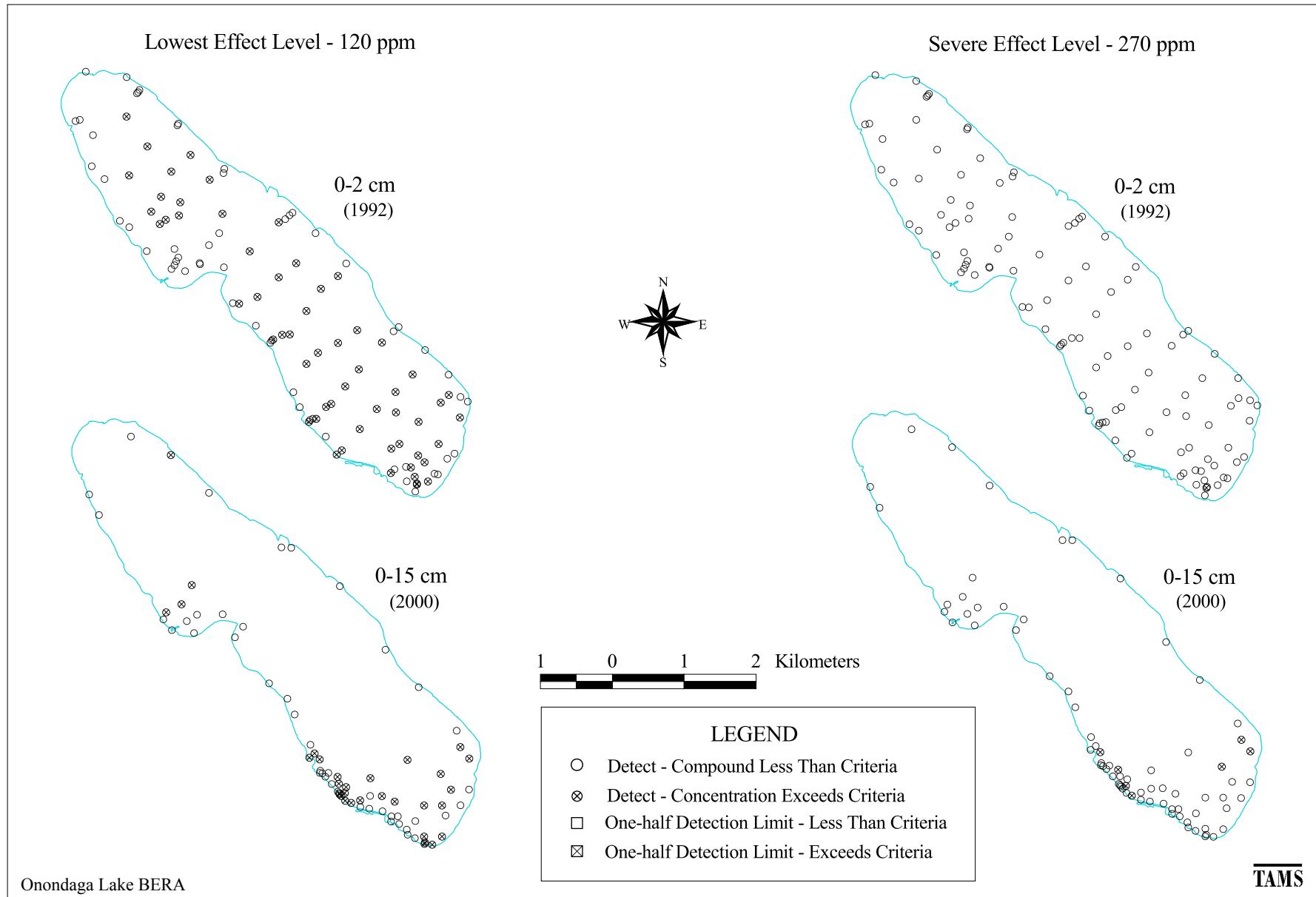


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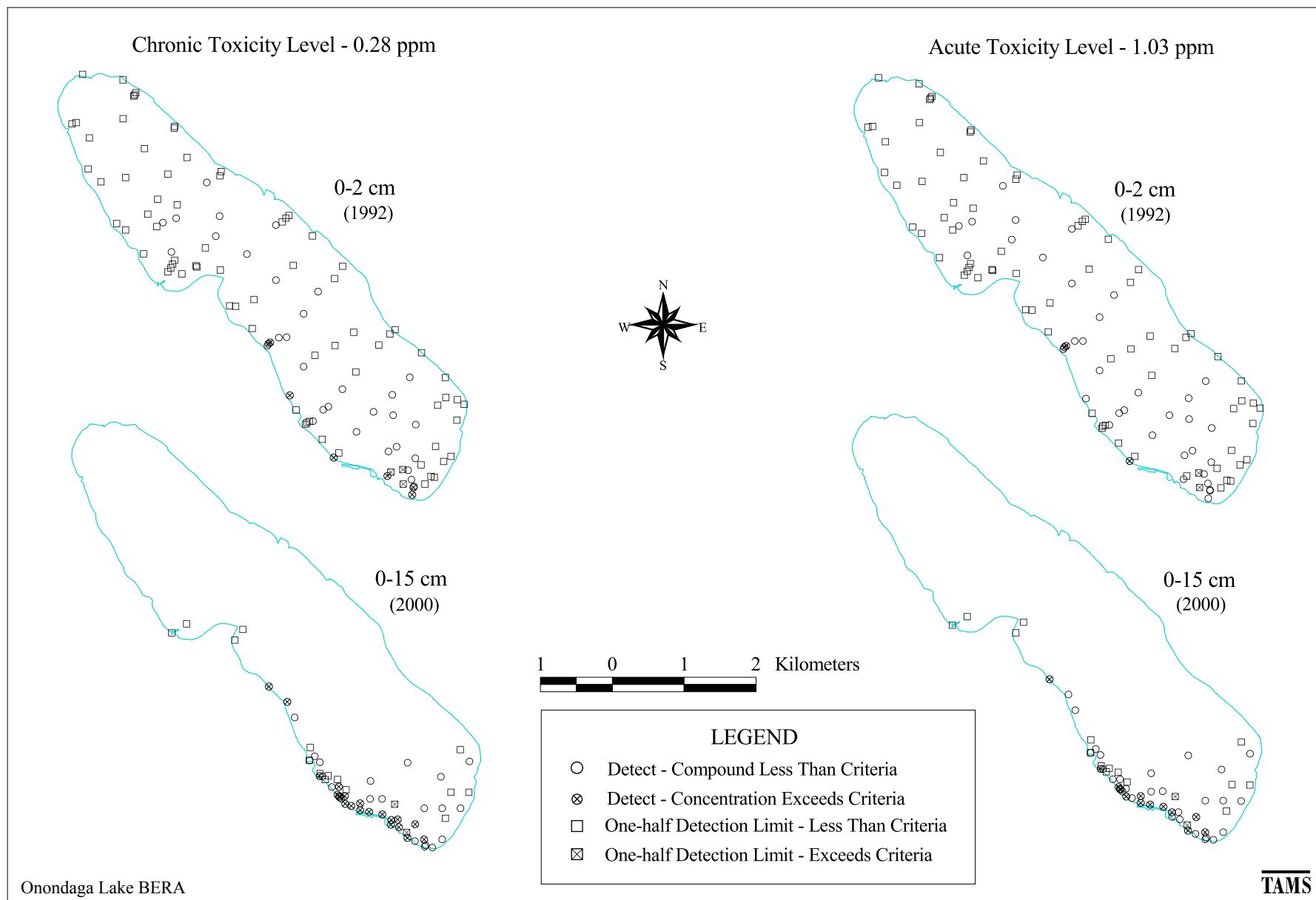


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Comparison of Benzene Sediment Concentrations with NYSDEC Screening Criteria

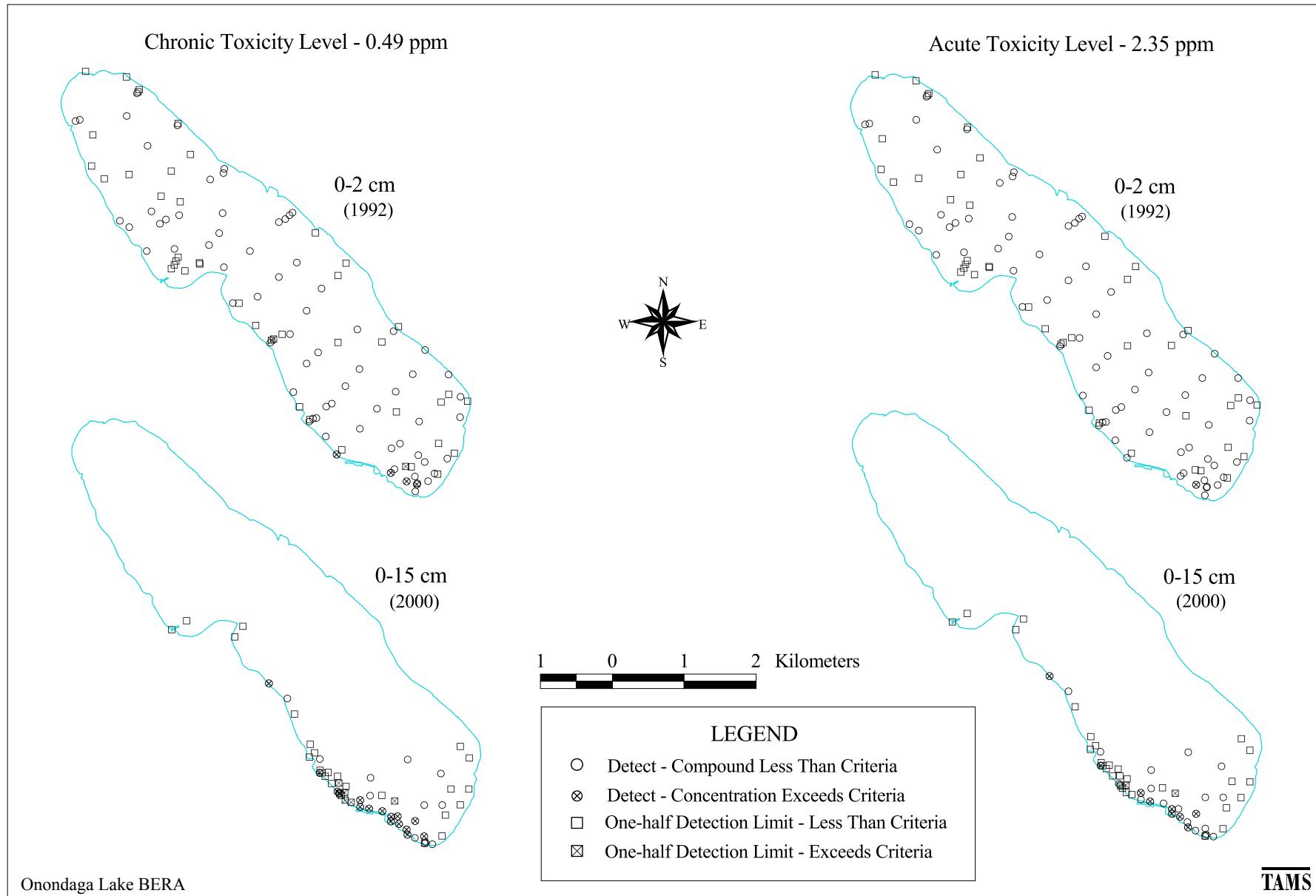


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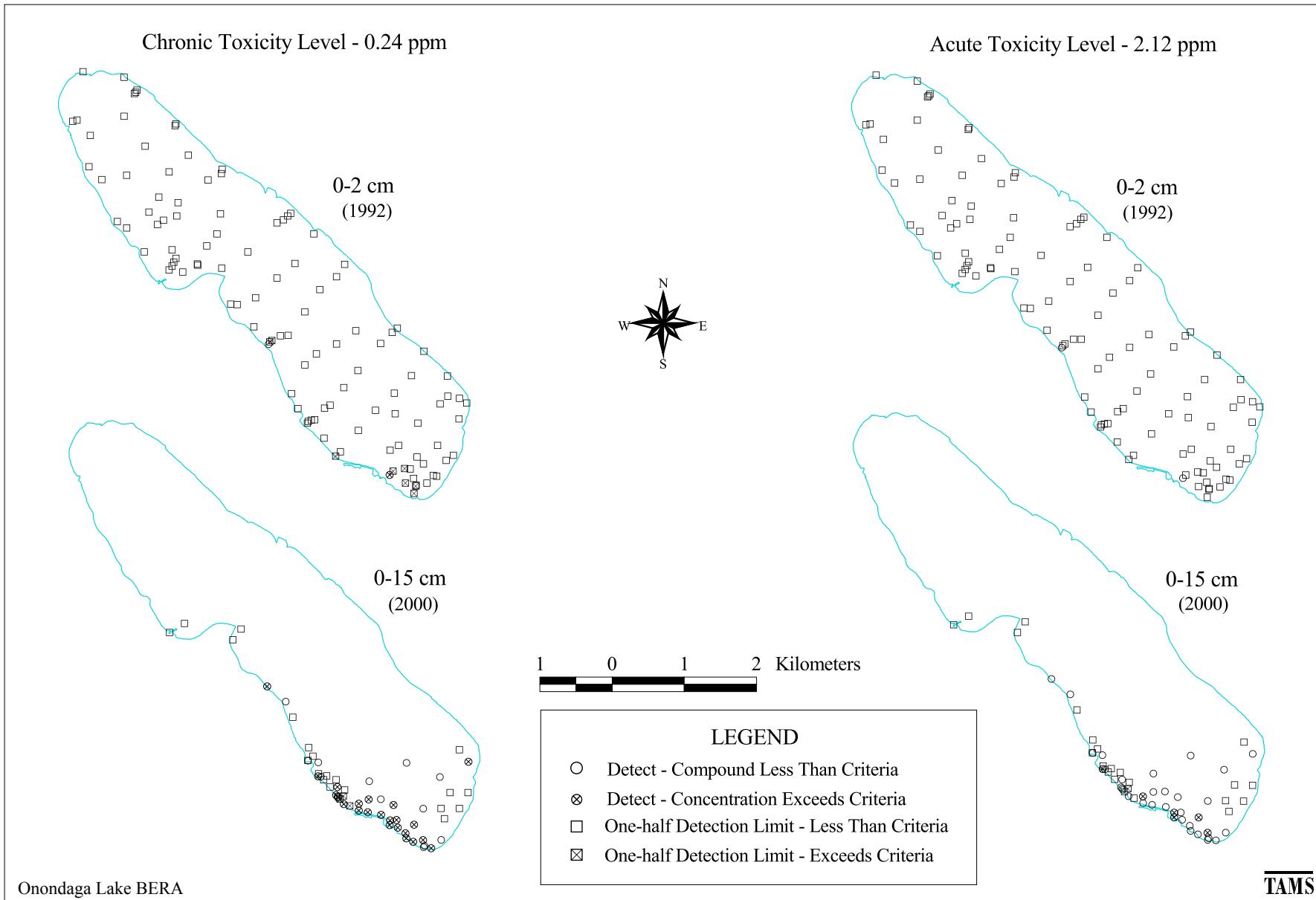


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Comparison of Ethylbenzene Sediment Concentrations with NYSDEC Screening Criteria

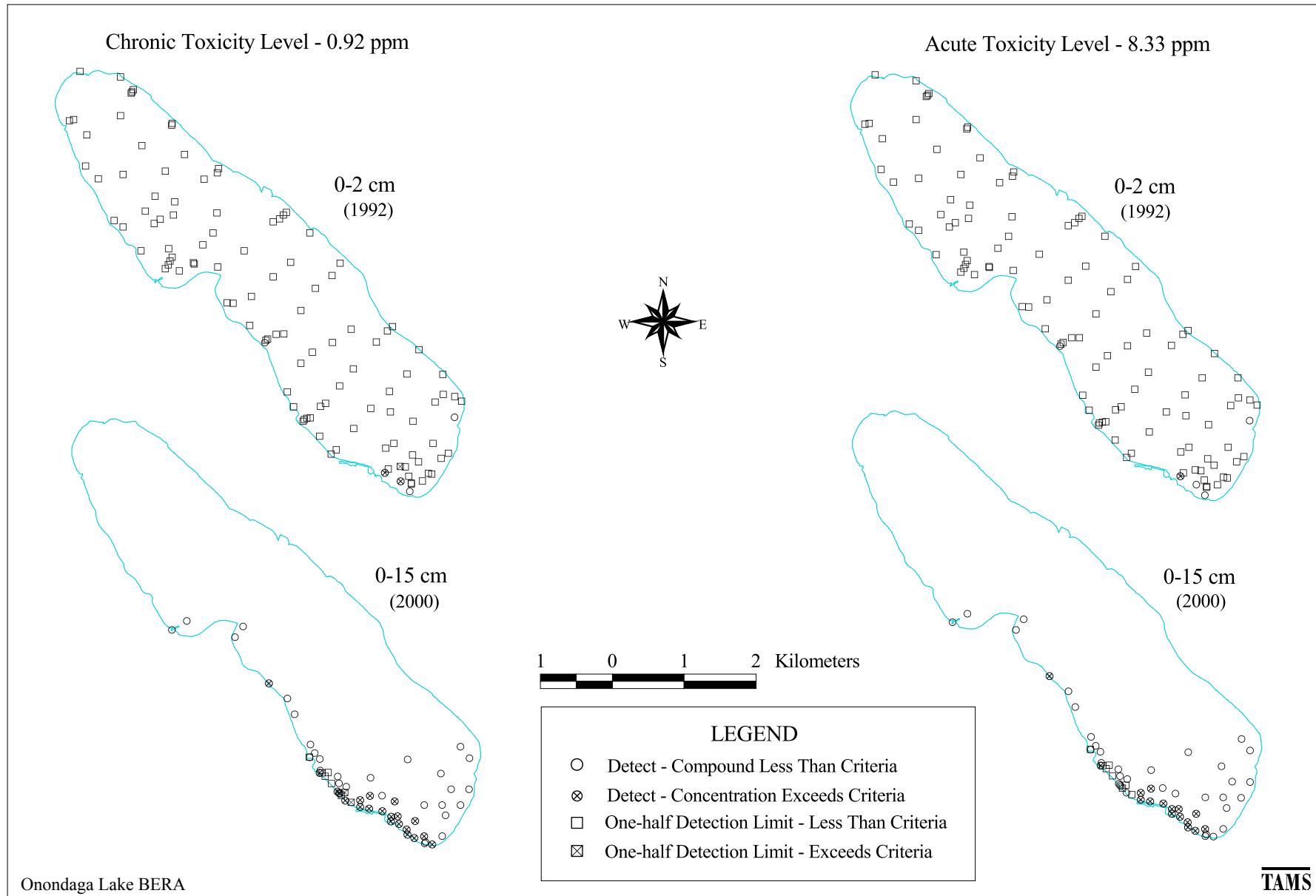


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Comparison of Xylenes Sediment Concentrations with NYSDEC Screening Criteria

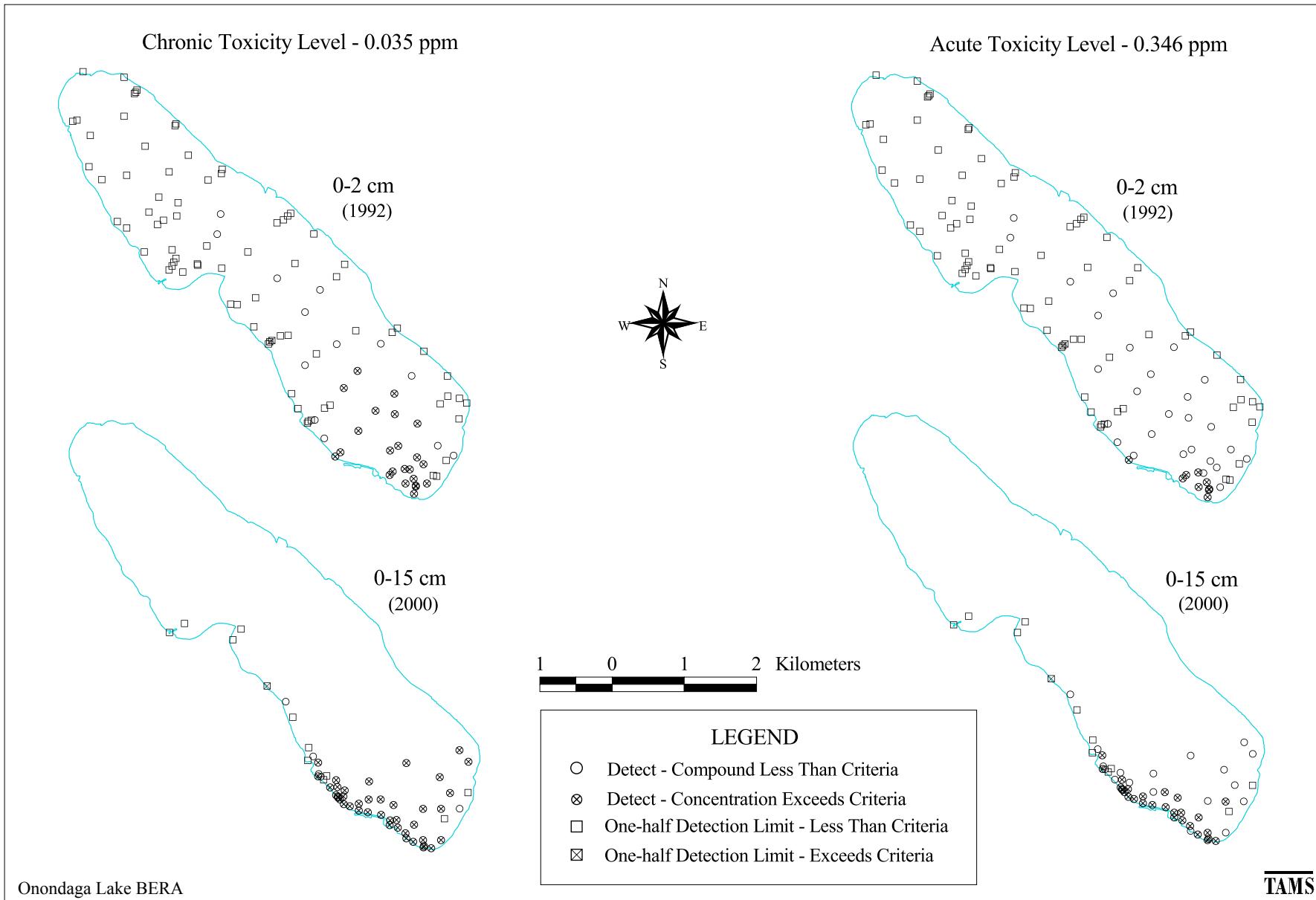


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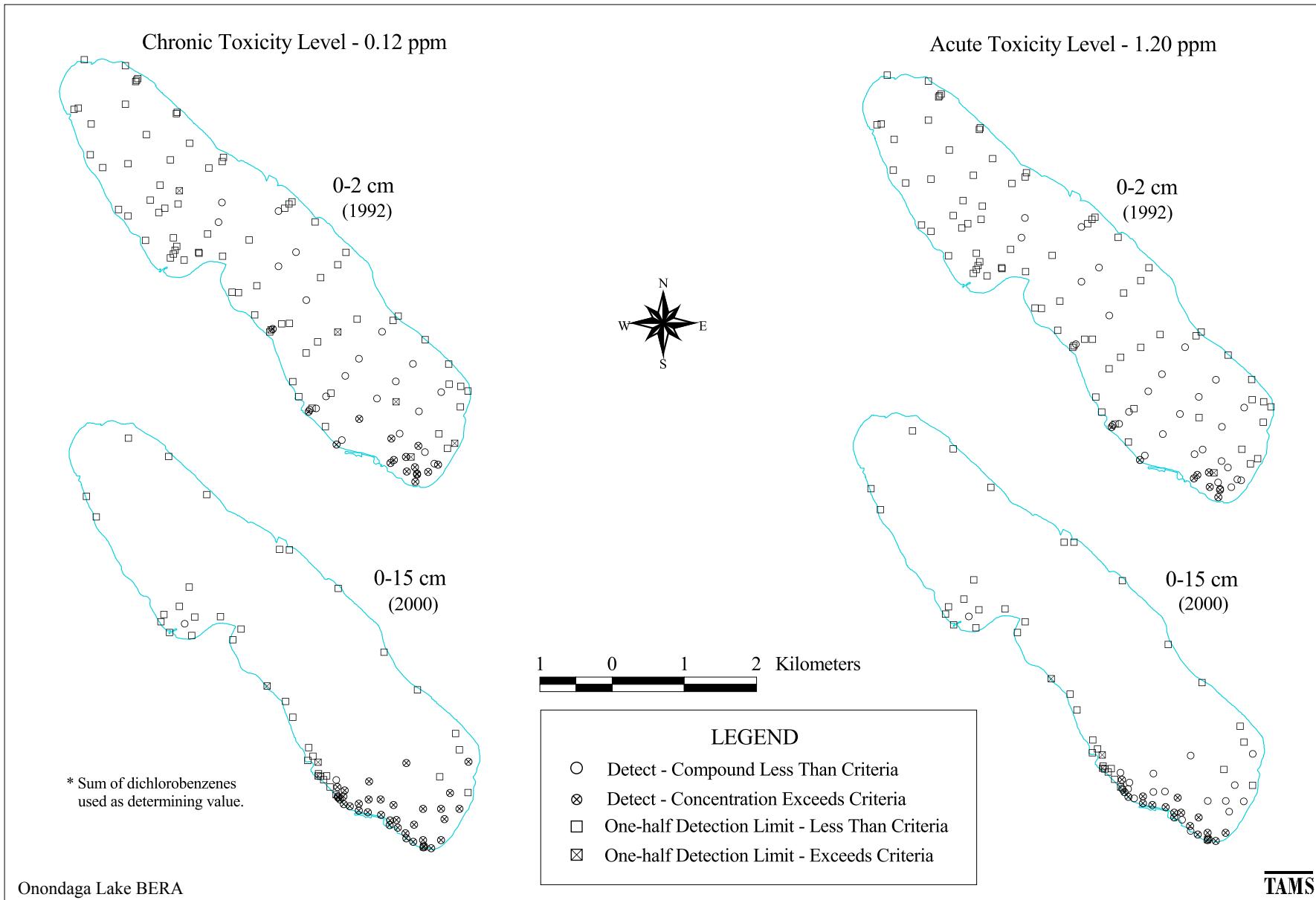


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Comparison of Dichlorobenzenes Sediment Concentrations with NYSDEC Screening Criteria

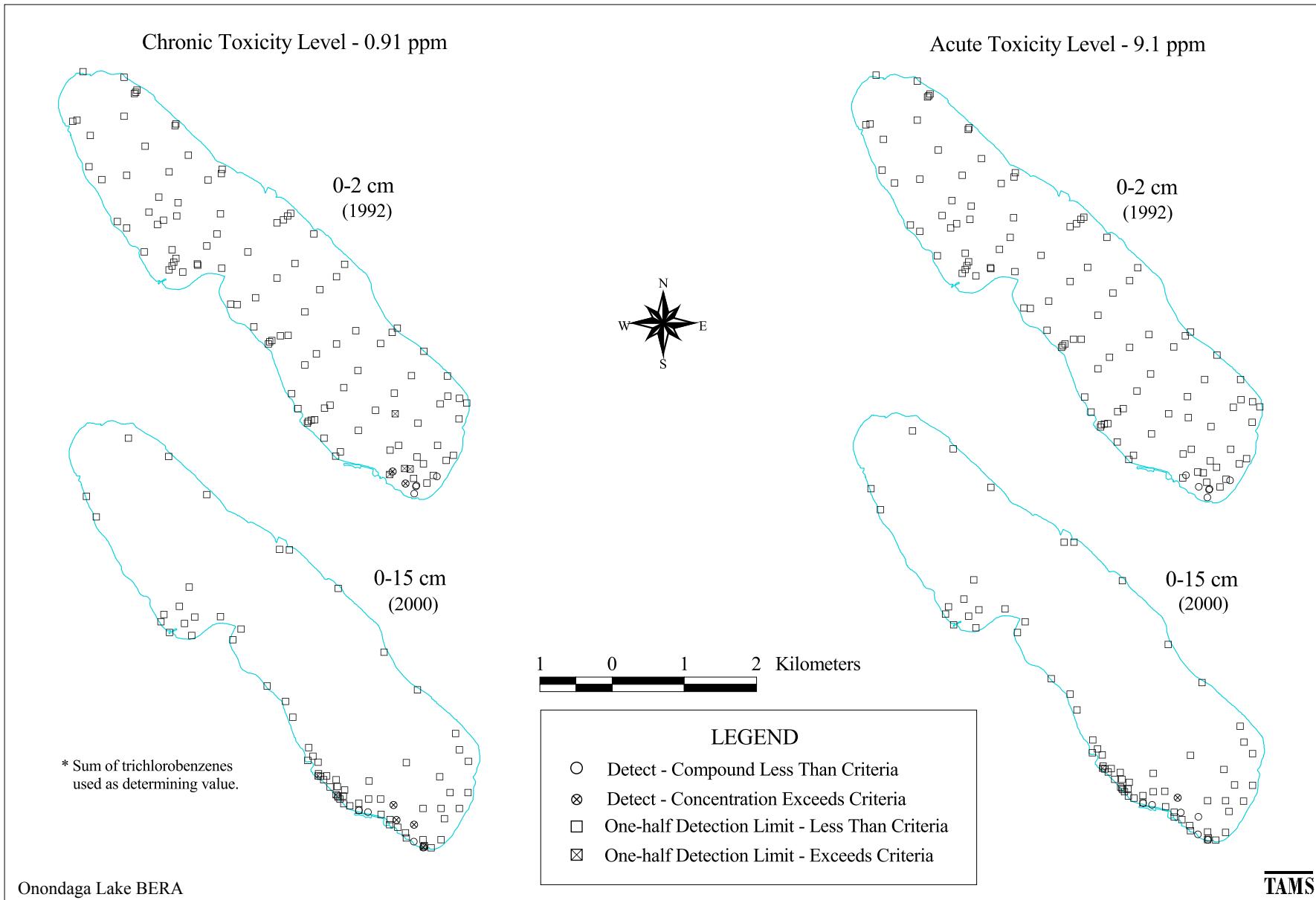


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Comparison of Trichlorobenzenes Sediment Concentrations with NYSDEC Screening Criteria

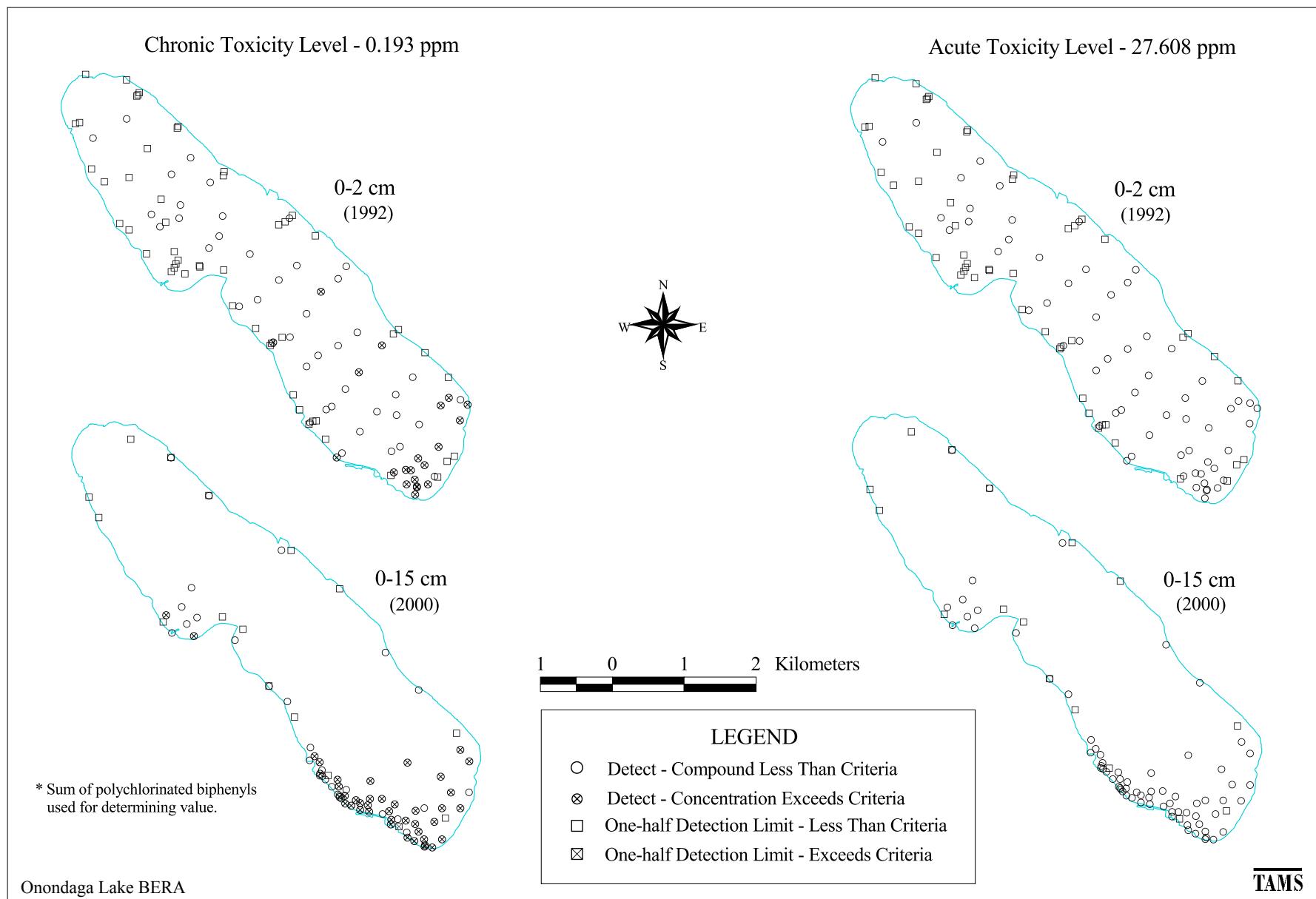


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Comparison of Polychlorinated Biphenyls Sediment Concentrations with NYSDEC Screening Criteria

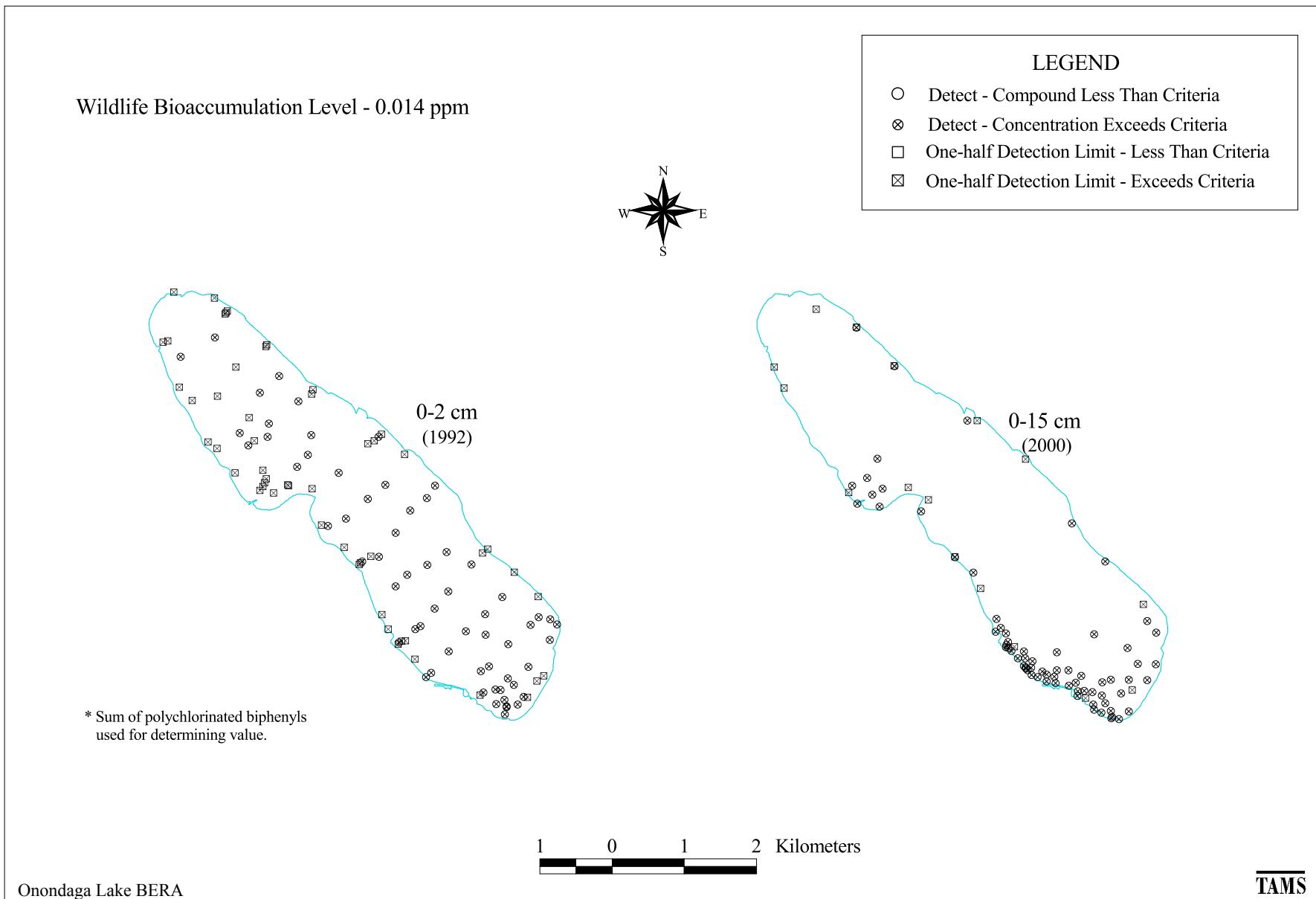


Figure E-21
Comparison of Polychlorinated Biphenyls Sediment Concentrations
with NYSDEC Wildlife Bioaccumulation Screening Criteria

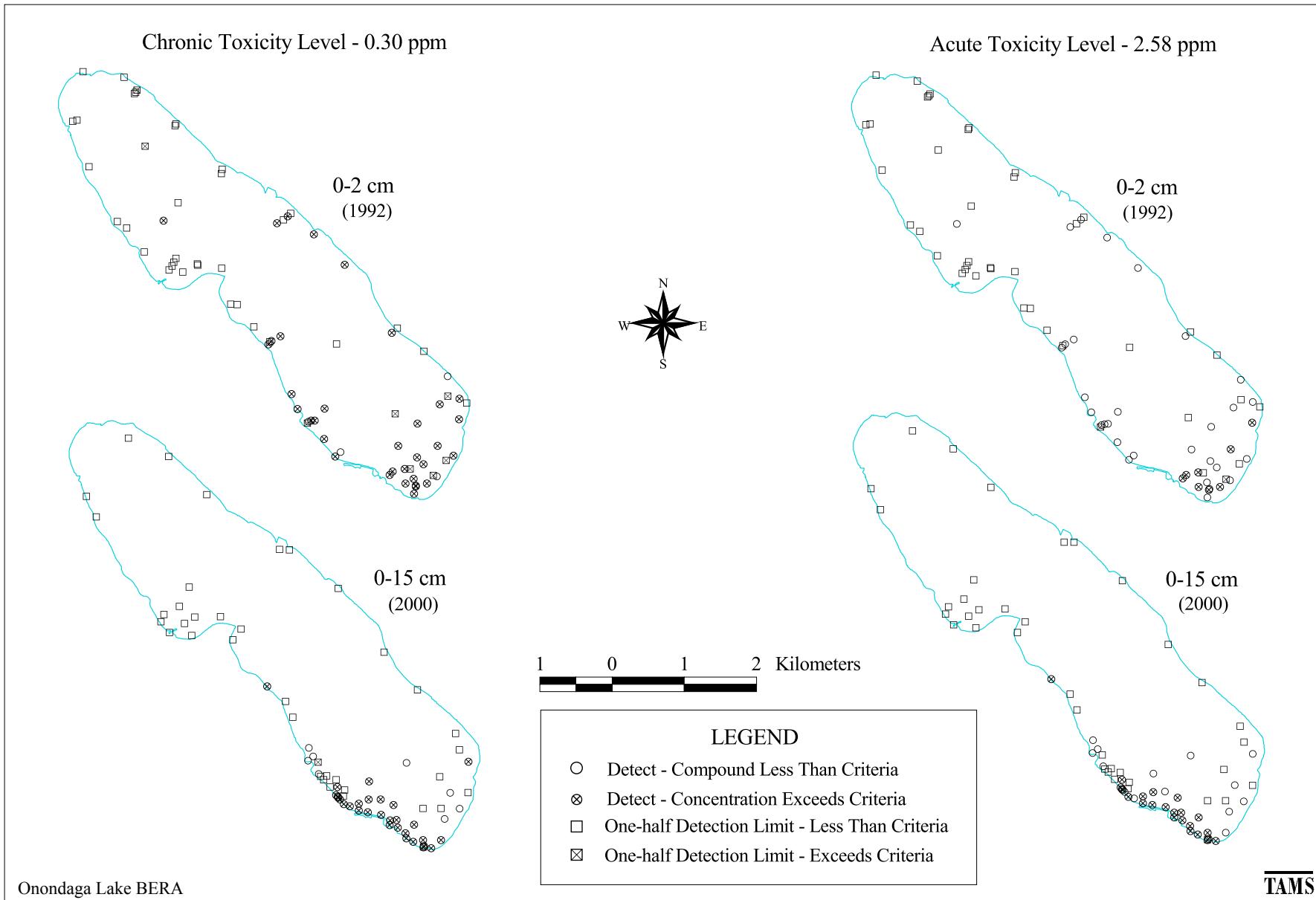


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Comparison of Naphthalene Sediment Concentrations with NYSDEC Screening Criteria

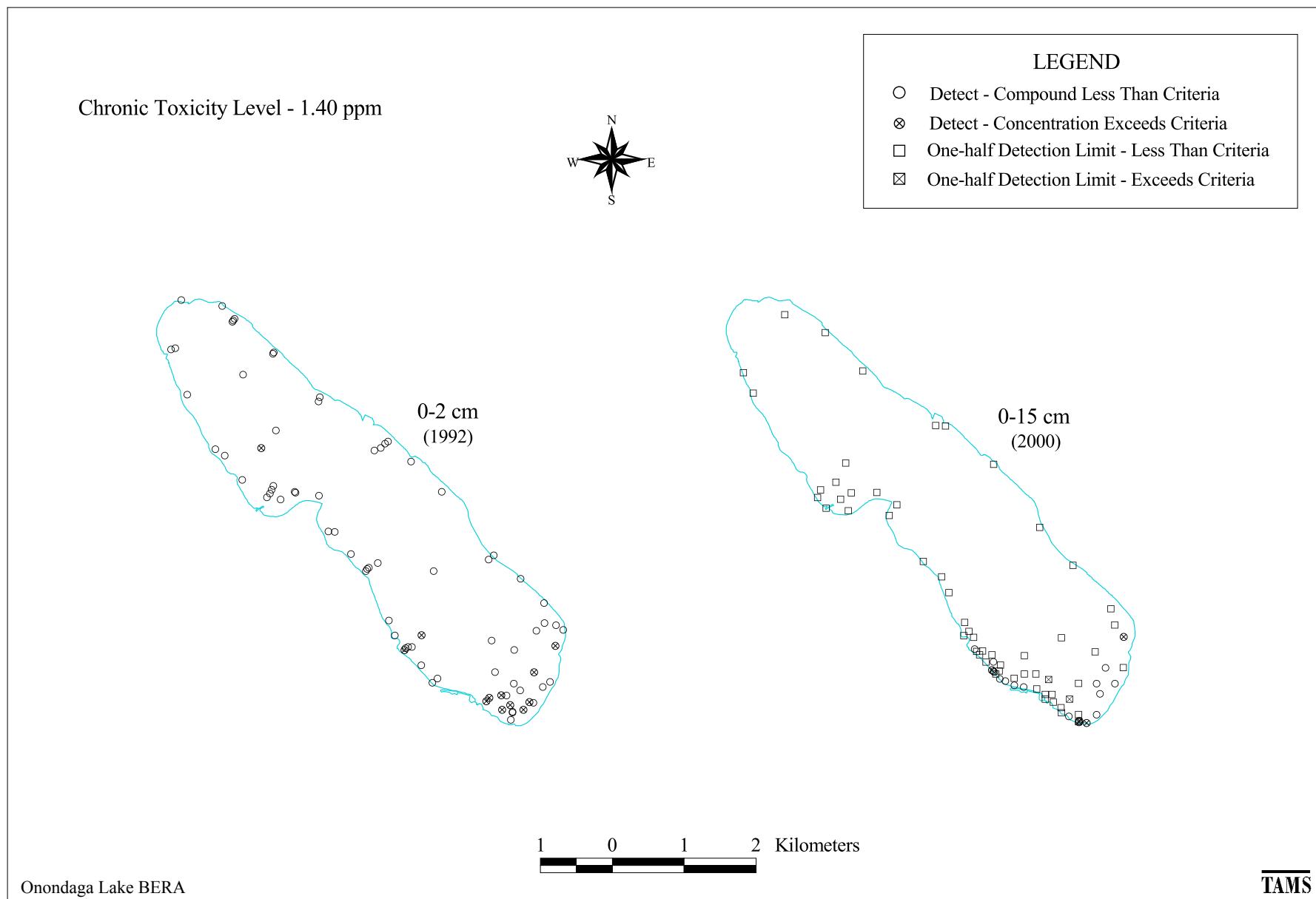


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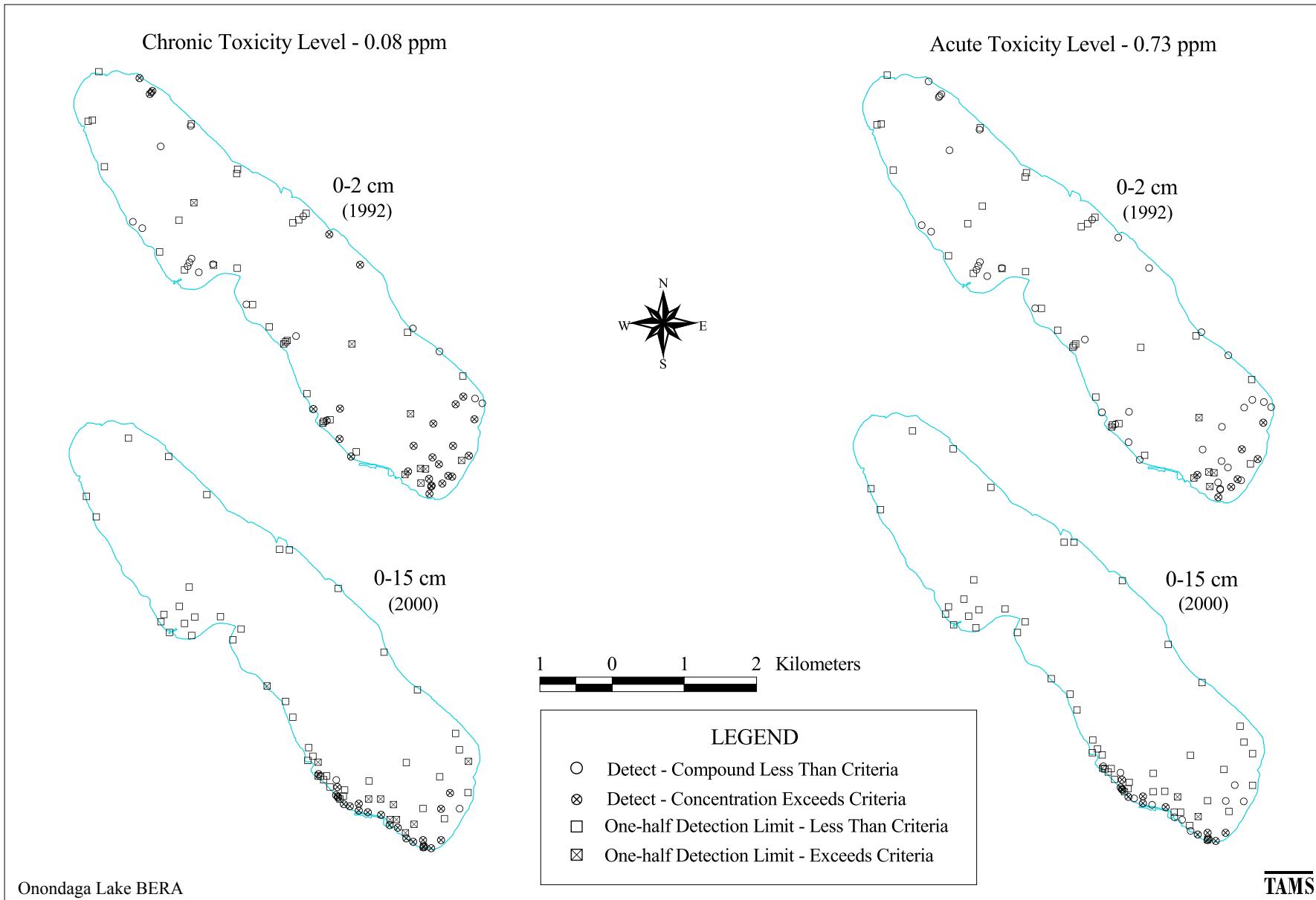


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Comparison of Fluorene Sediment Concentrations with NYSDEC Screening Criteria

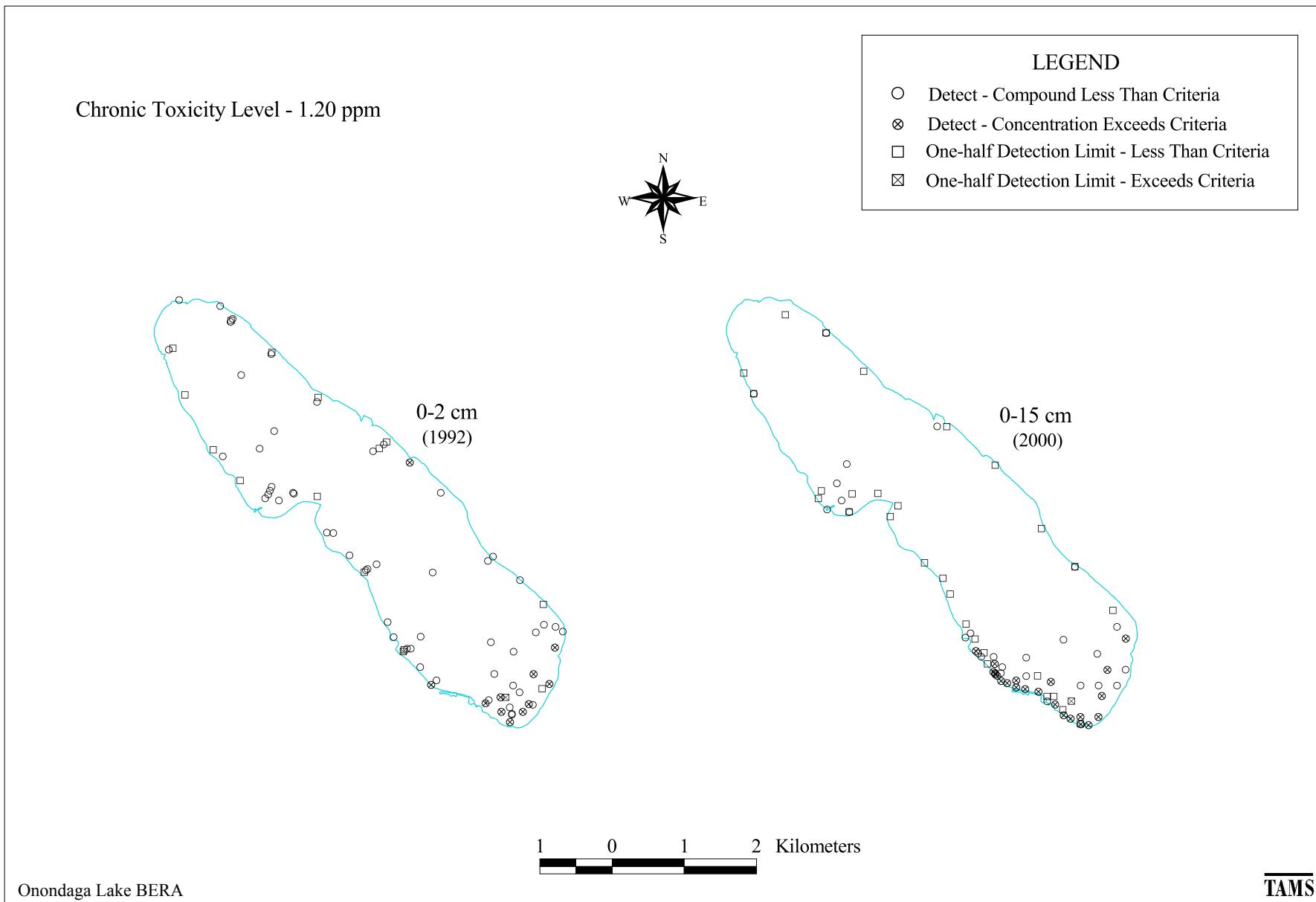


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Comparison of Phenanthrene Sediment Concentrations with NYSDEC Screening Criteria

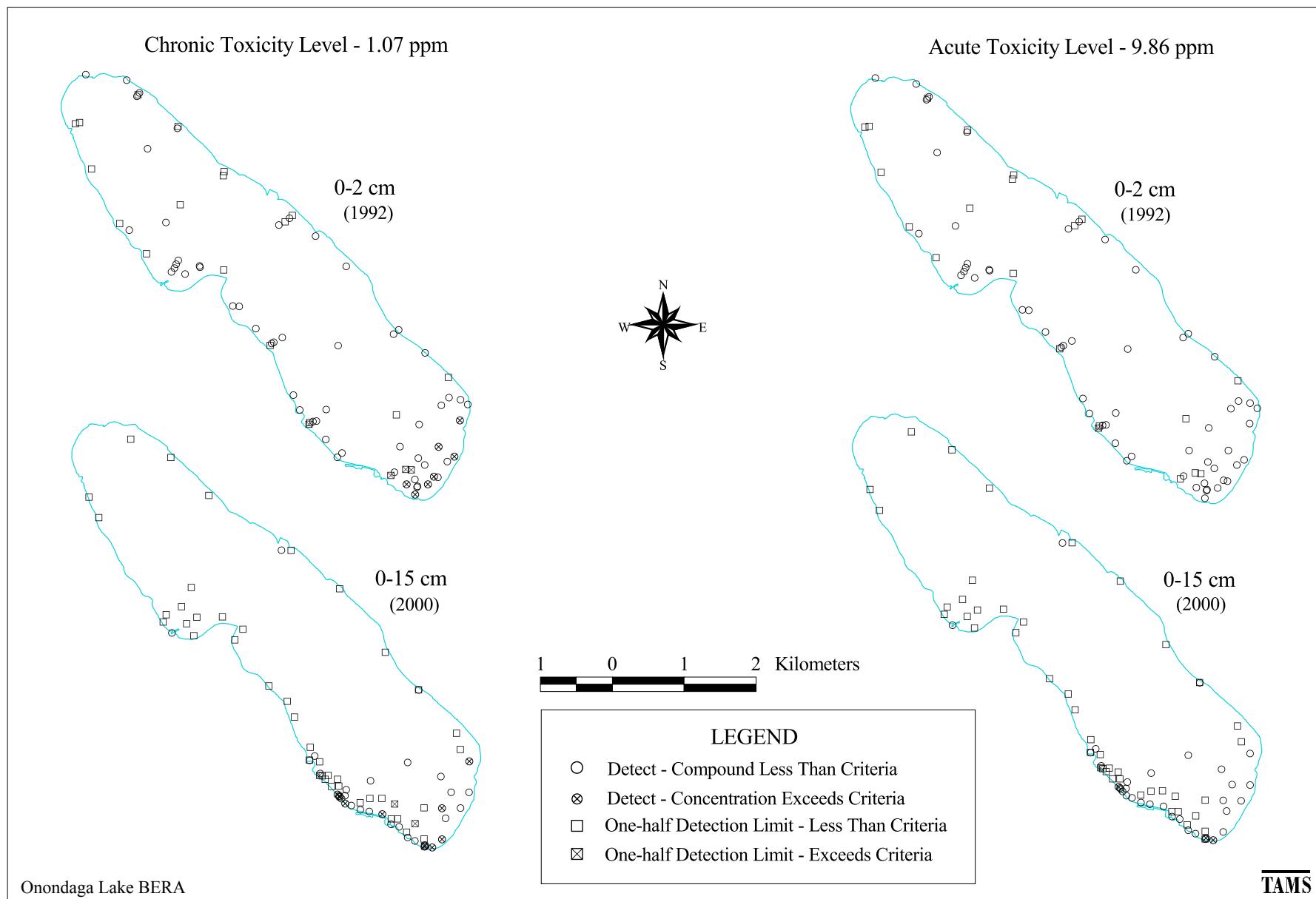


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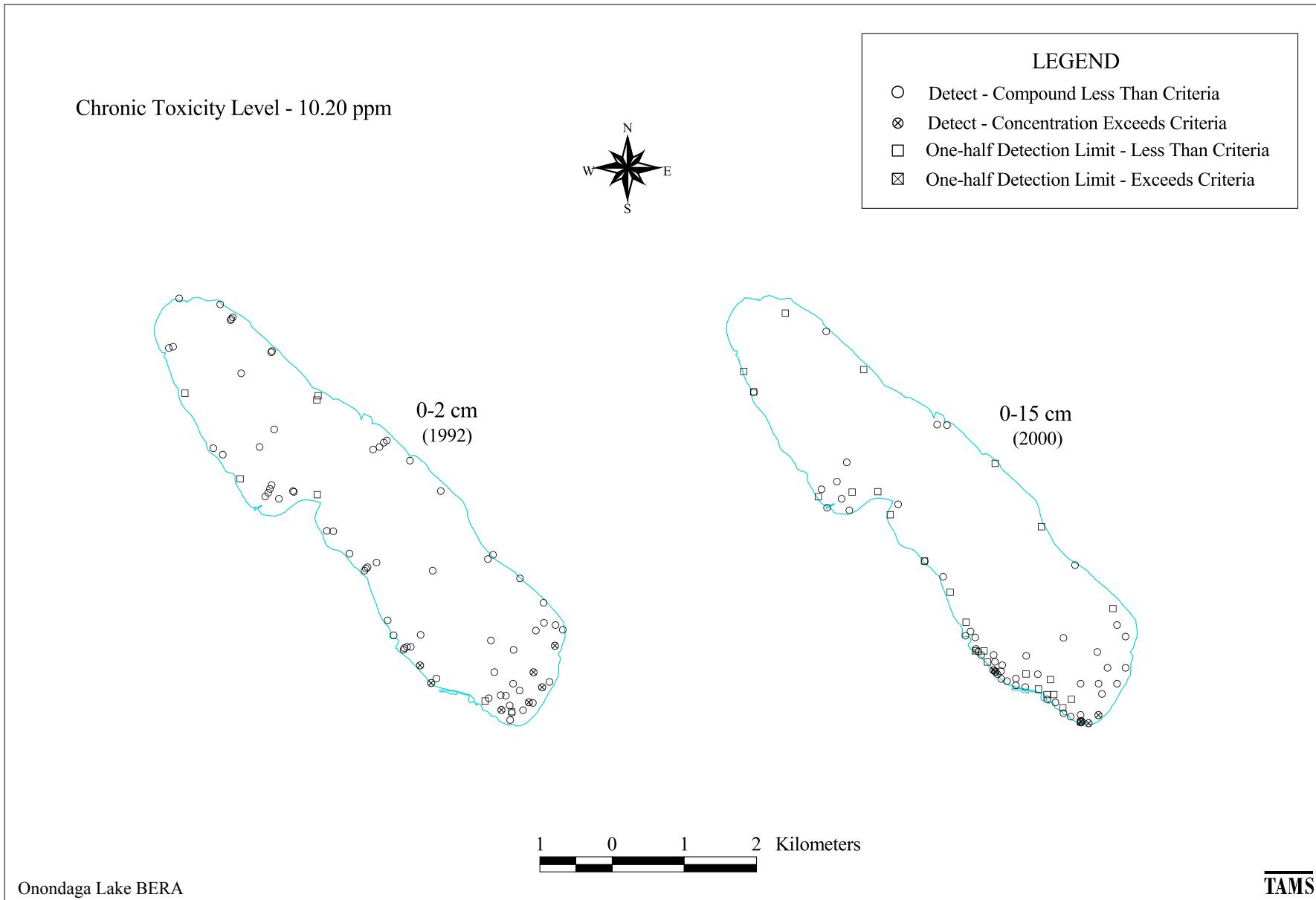


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Comparison of Fluoranthene Sediment Concentrations with NYSDEC Screening Criteria

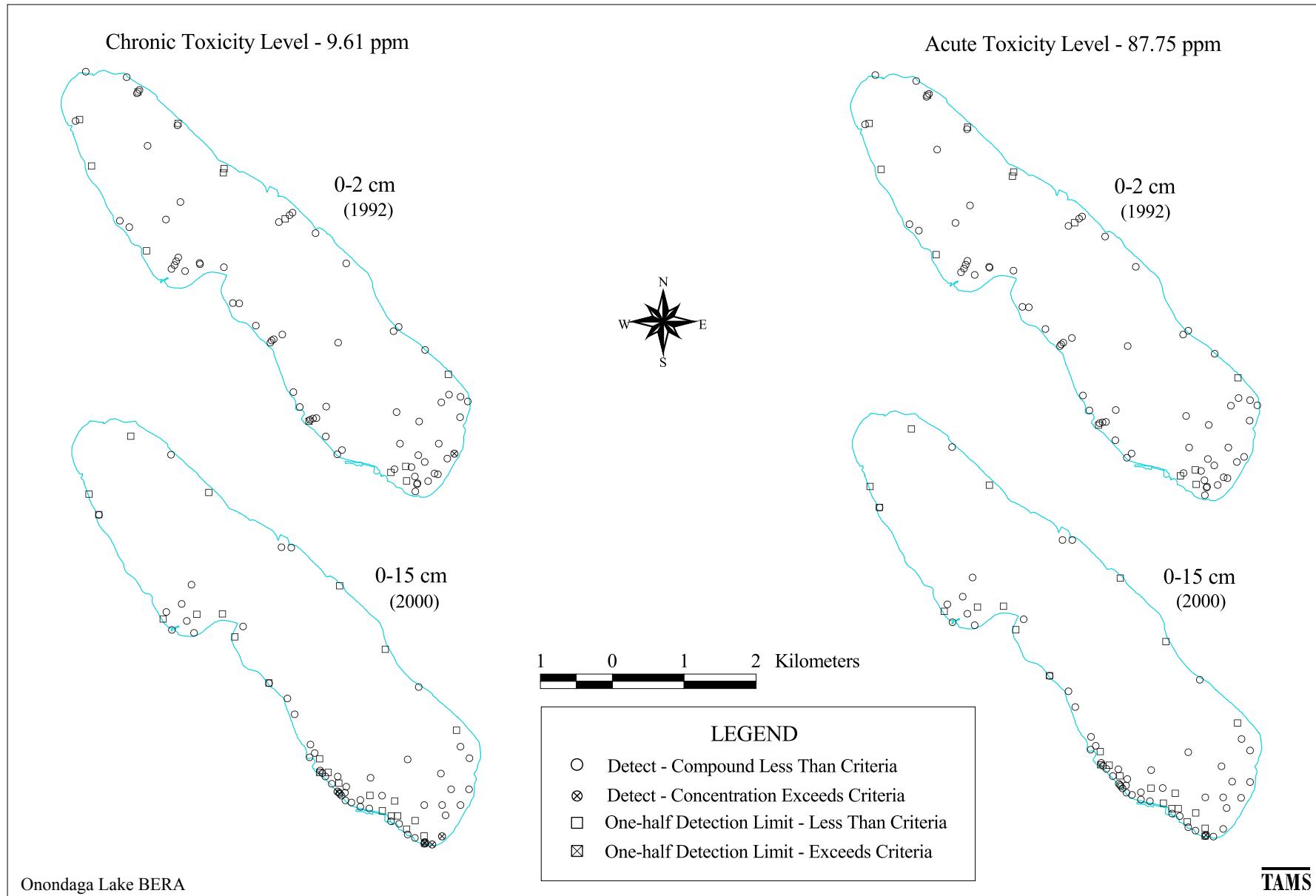


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Comparison of Pyrene Sediment Concentrations with NYSDEC Screening Criteria

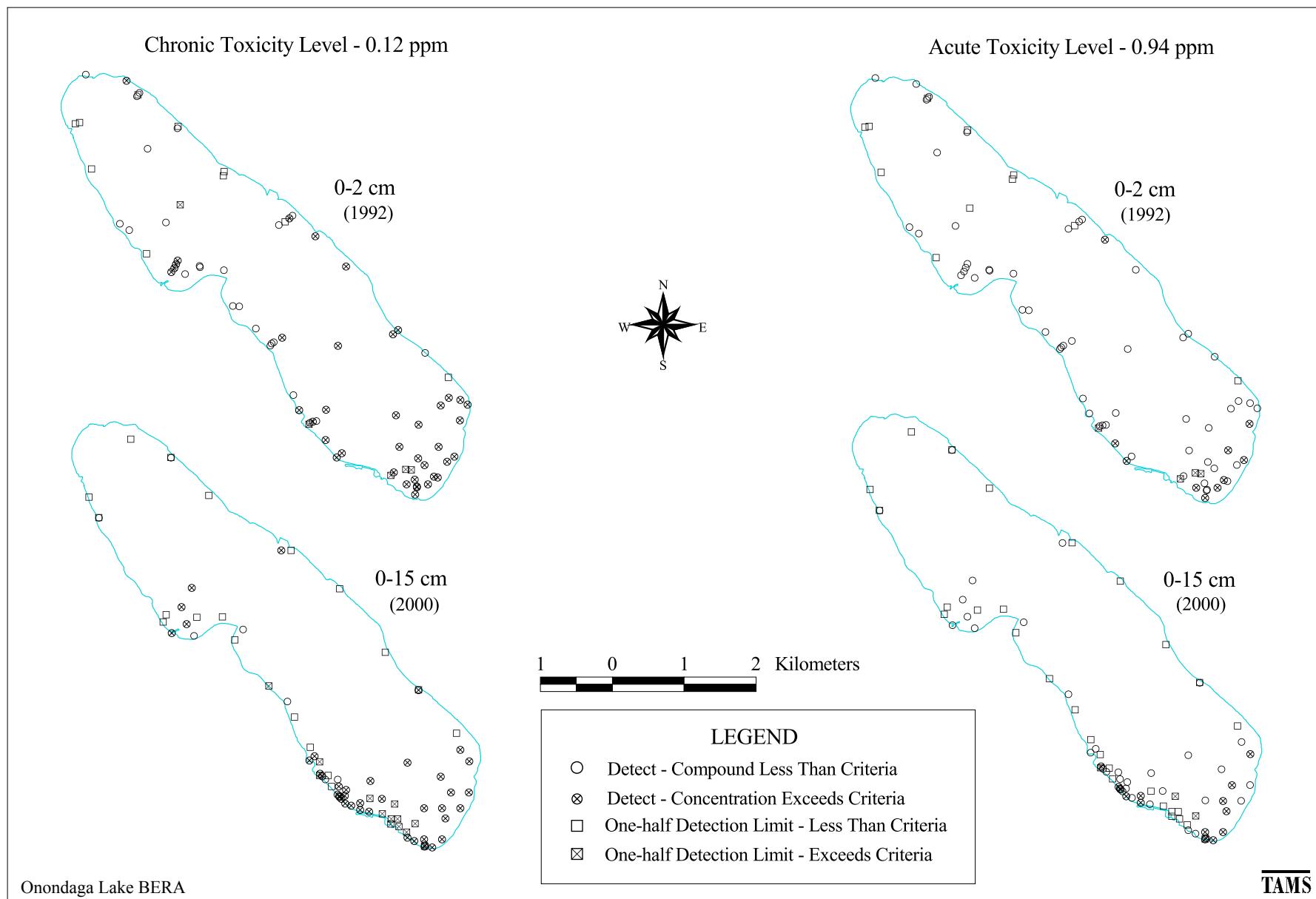


Figure E-29
Comparison of Benz(a)anthracene Sediment Concentrations with NYSDEC Screening Criteria

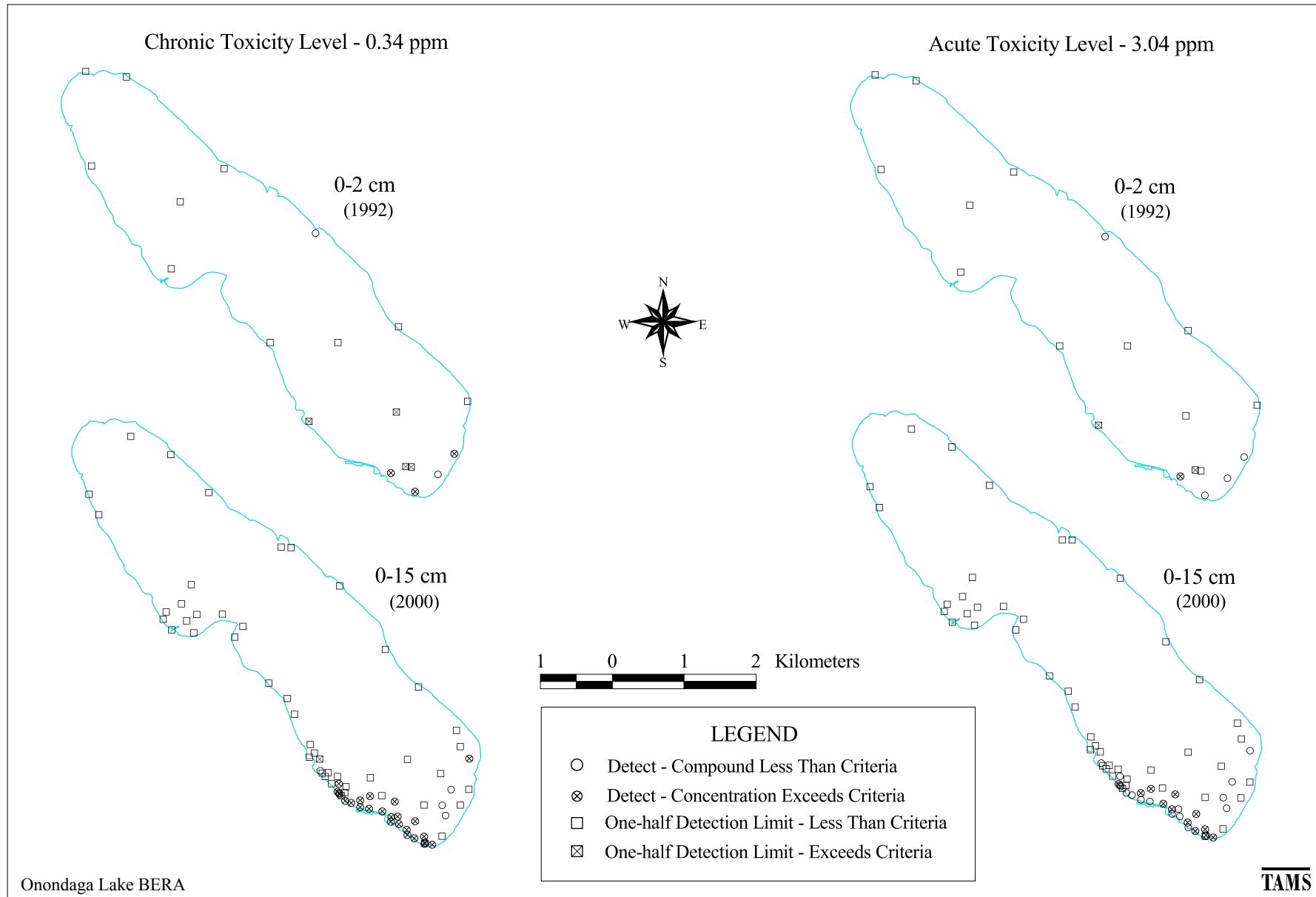


Figure E-30
Comparison of 2-Methylnaphthalene Sediment Concentrations with NYSDEC Screening Criteria

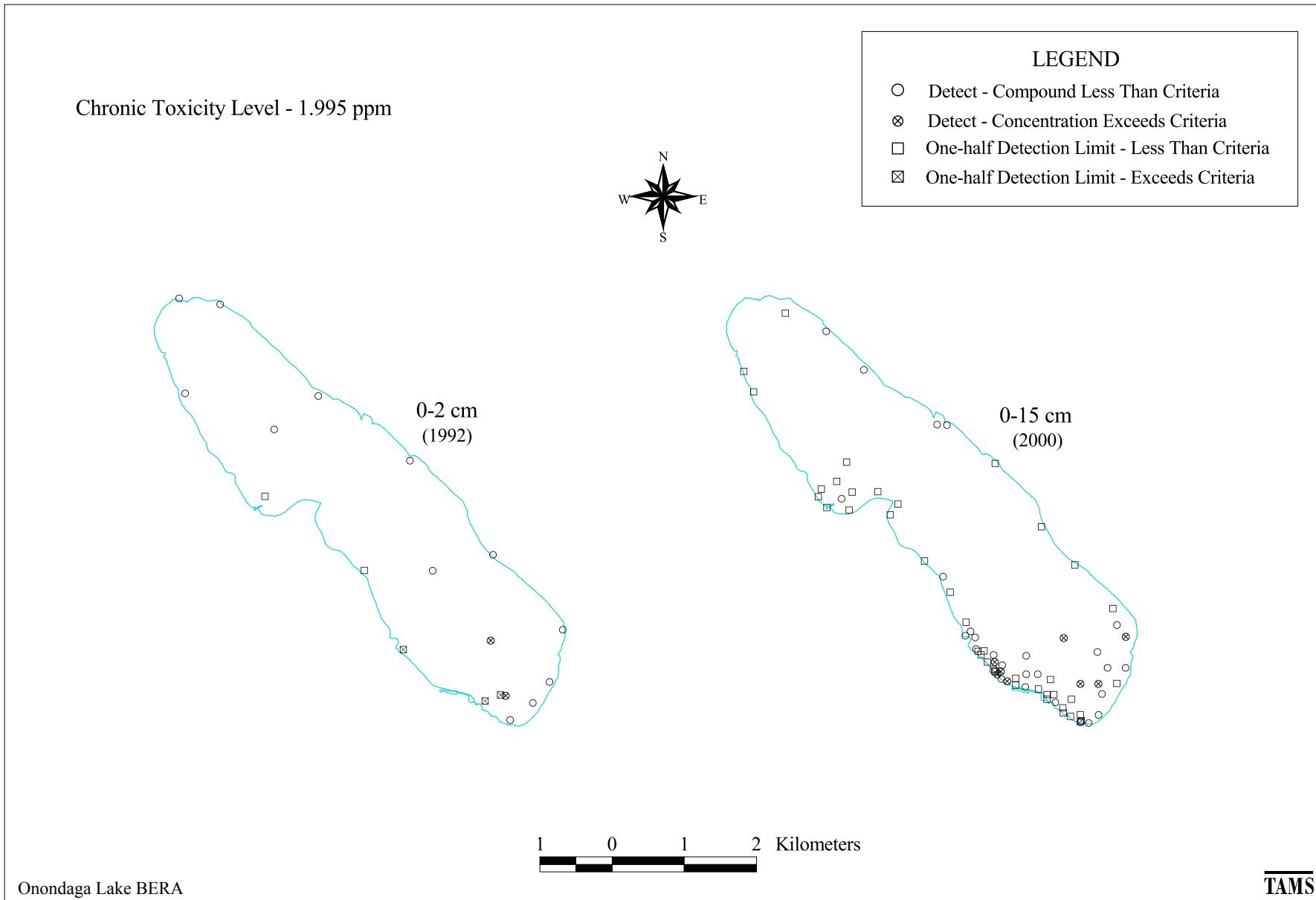


Figure E-31
Comparison of Bis(2-ethylhexyl) Phthalate Sediment Concentrations with NYSDEC Screening Criteria

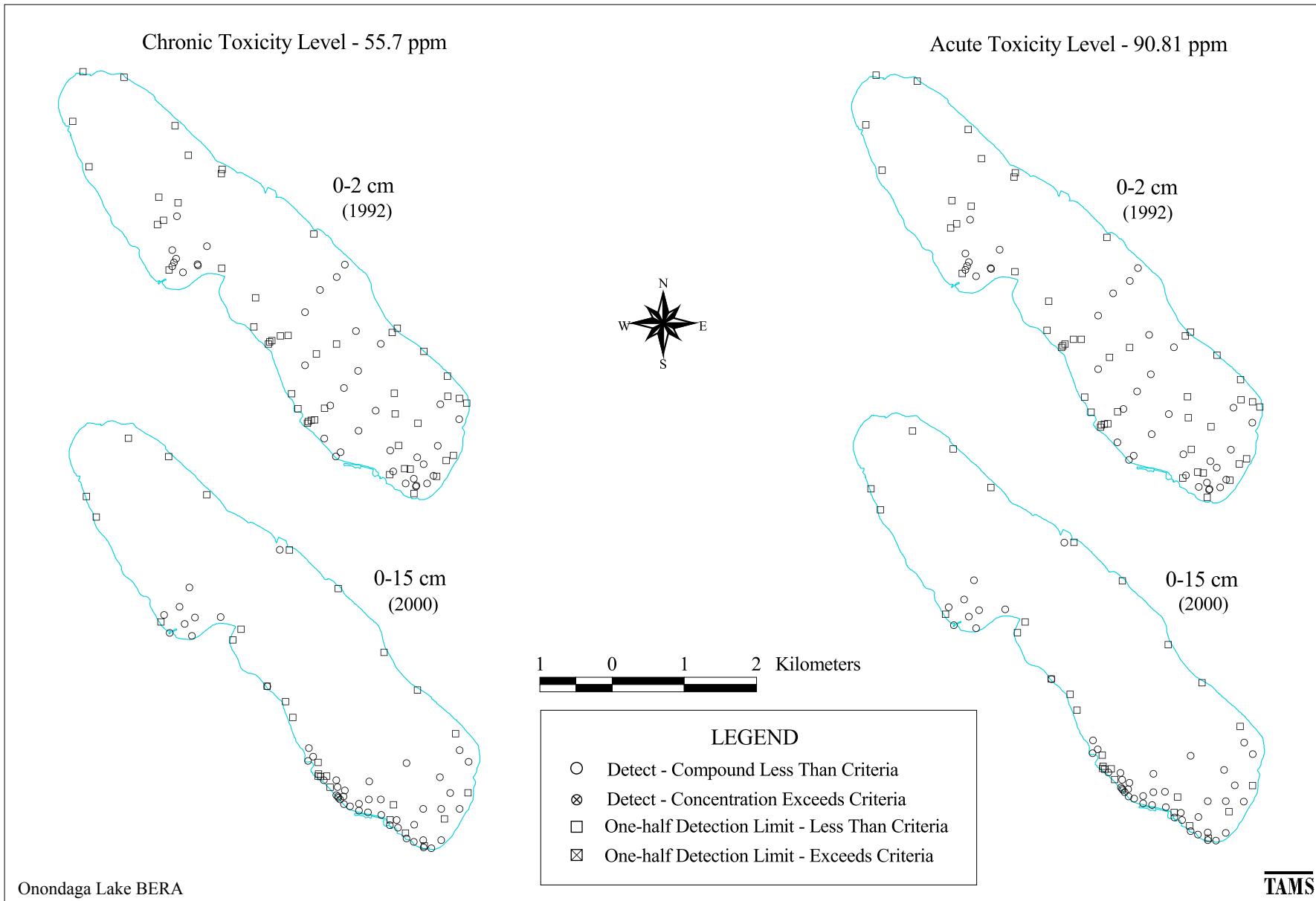


Figure E-32
Comparison of Hexachlorobenzene Sediment Concentrations with NYSDEC Screening Criteria

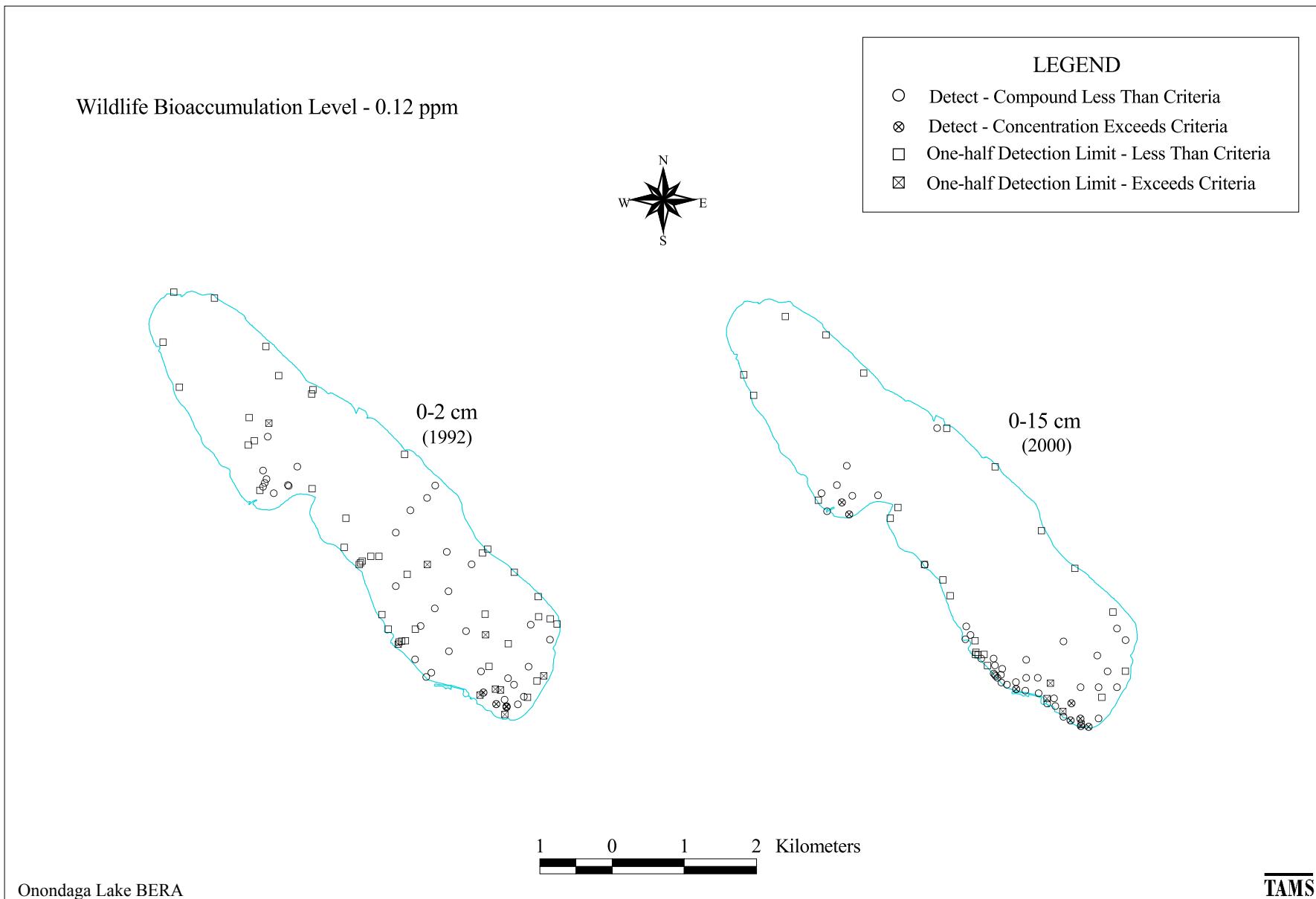


Figure E-33
Comparison of Hexachlorobenzene Sediment Concentrations
with NYSDEC Wildlife Bioaccumulation Screening Criteria

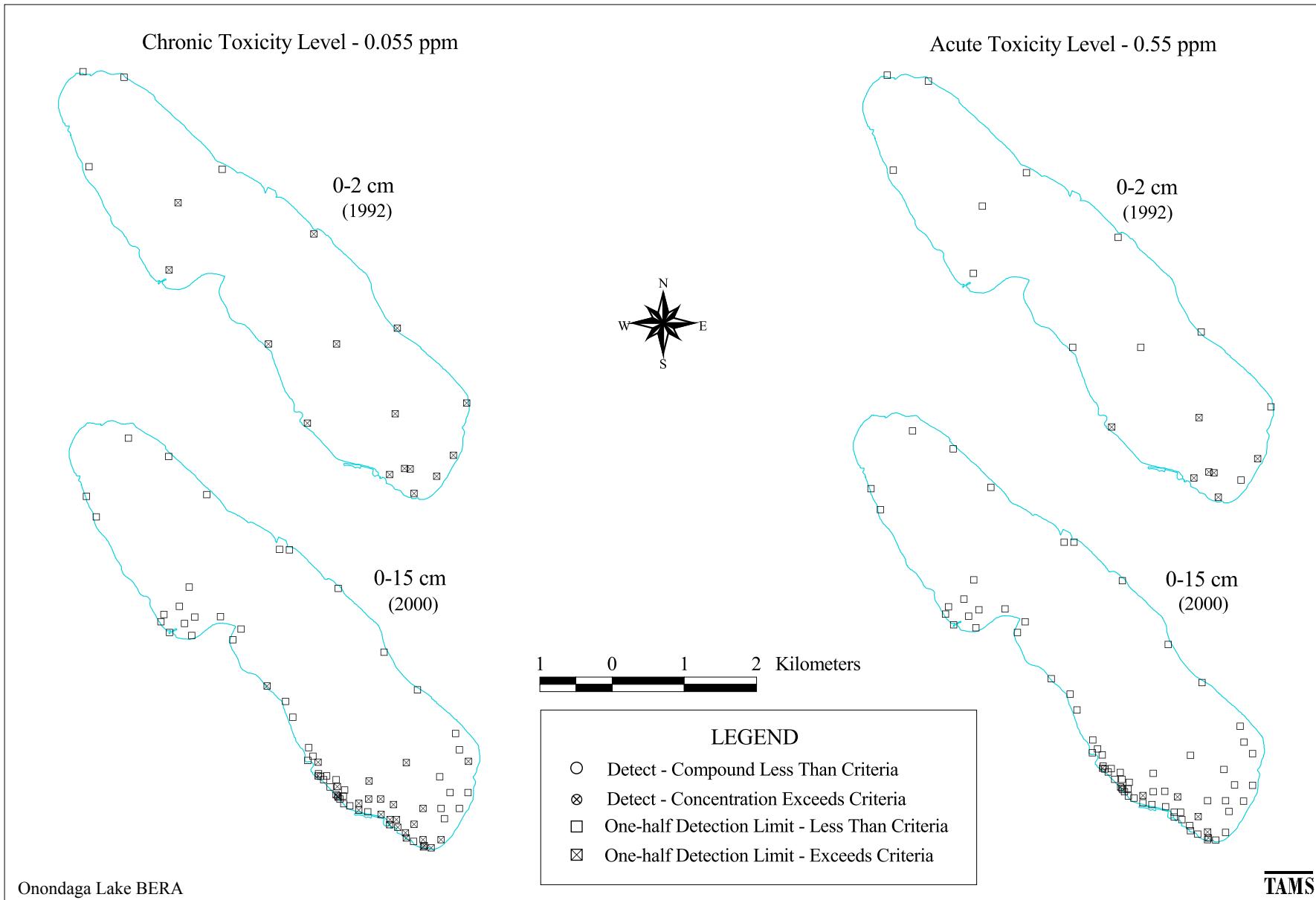


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Comparison of Hexachlorobutadiene Sediment Concentrations with NYSDEC Screening Criteria

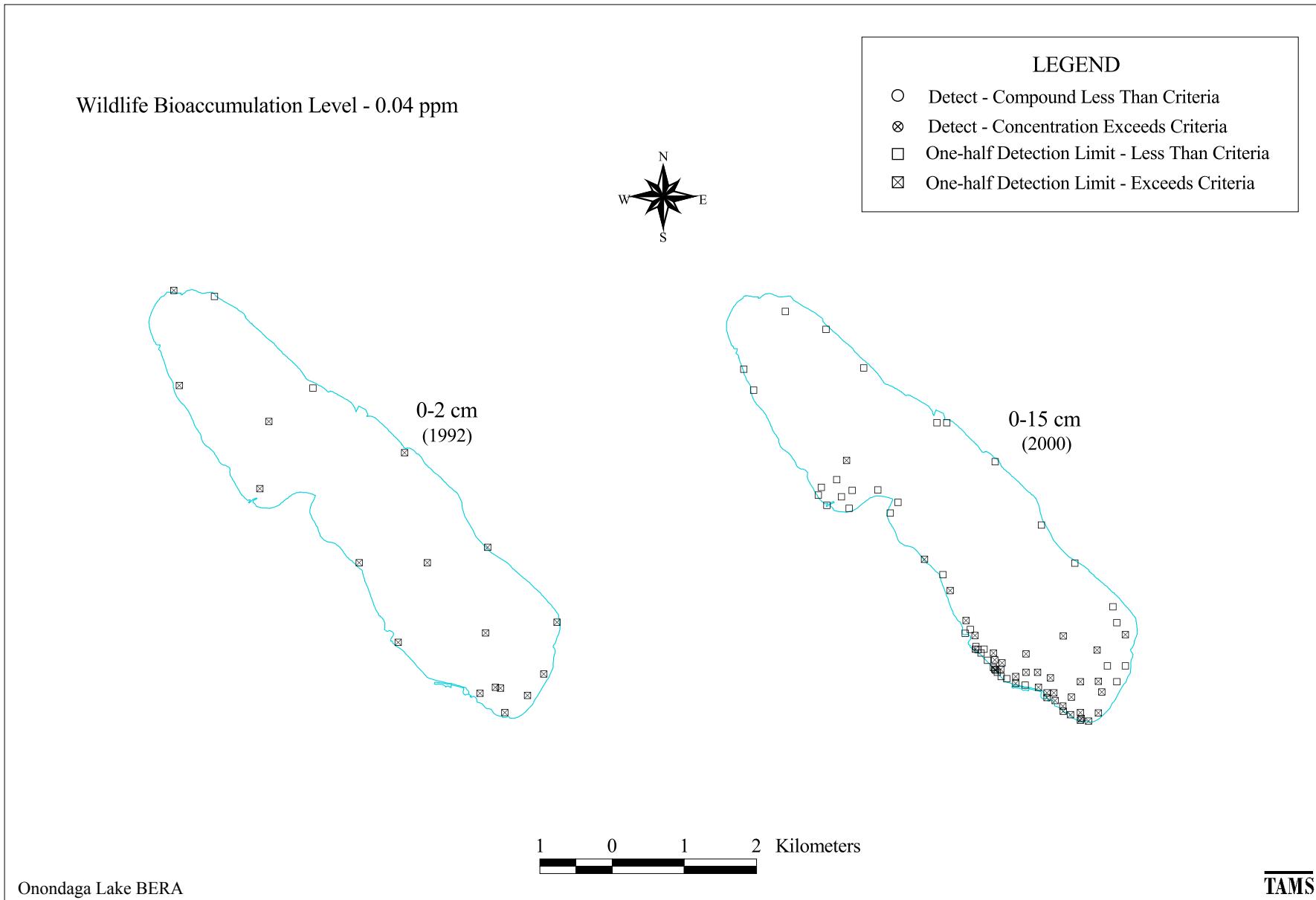


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Comparison of Hexachlorobutadiene Sediment Concentrations
with NYSDEC Wildlife Bioaccumulation Screening Criteria

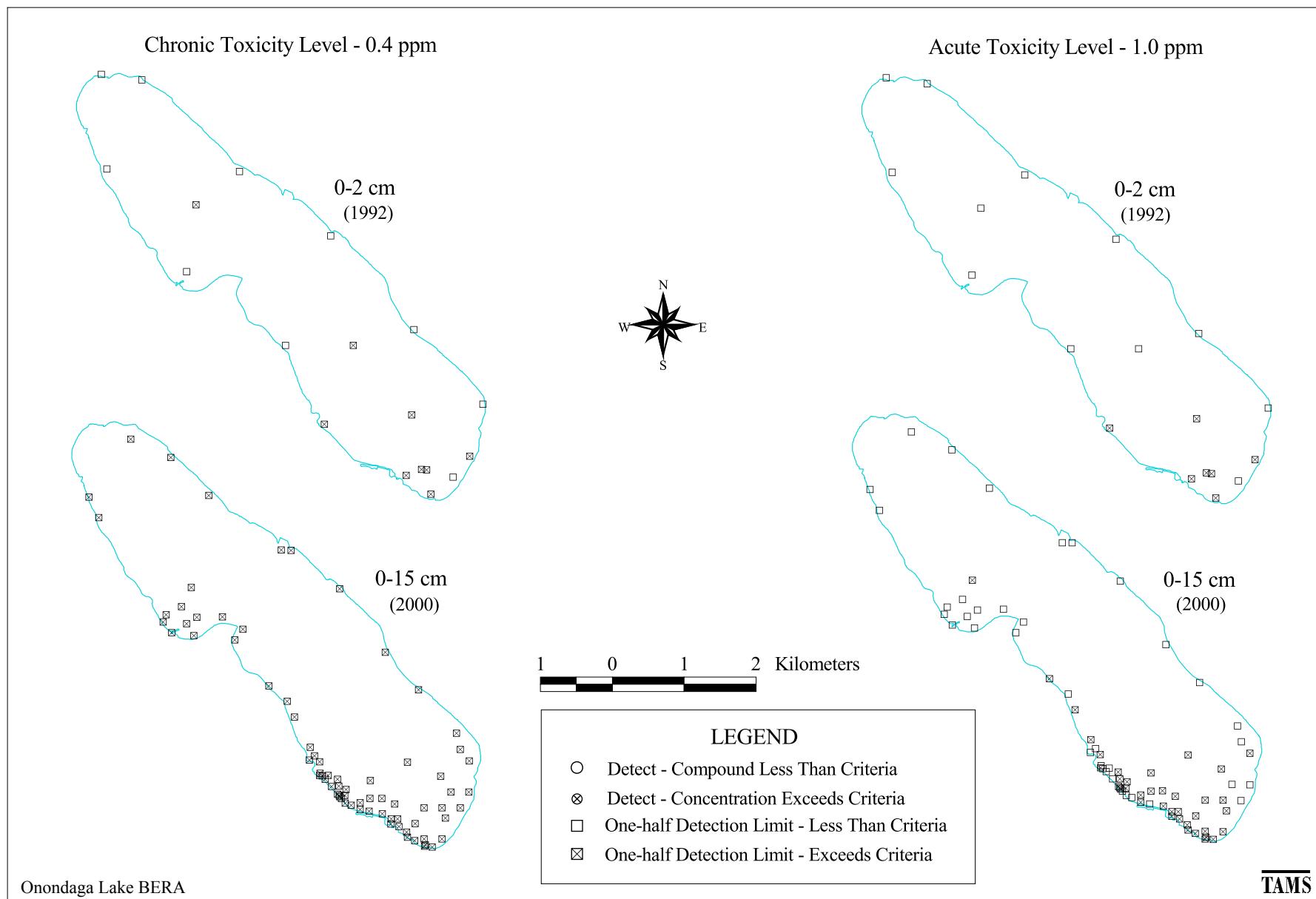


Figure E-36
Comparison of Pentachlorophenol Sediment Concentrations with NYSDEC Screening Criteria

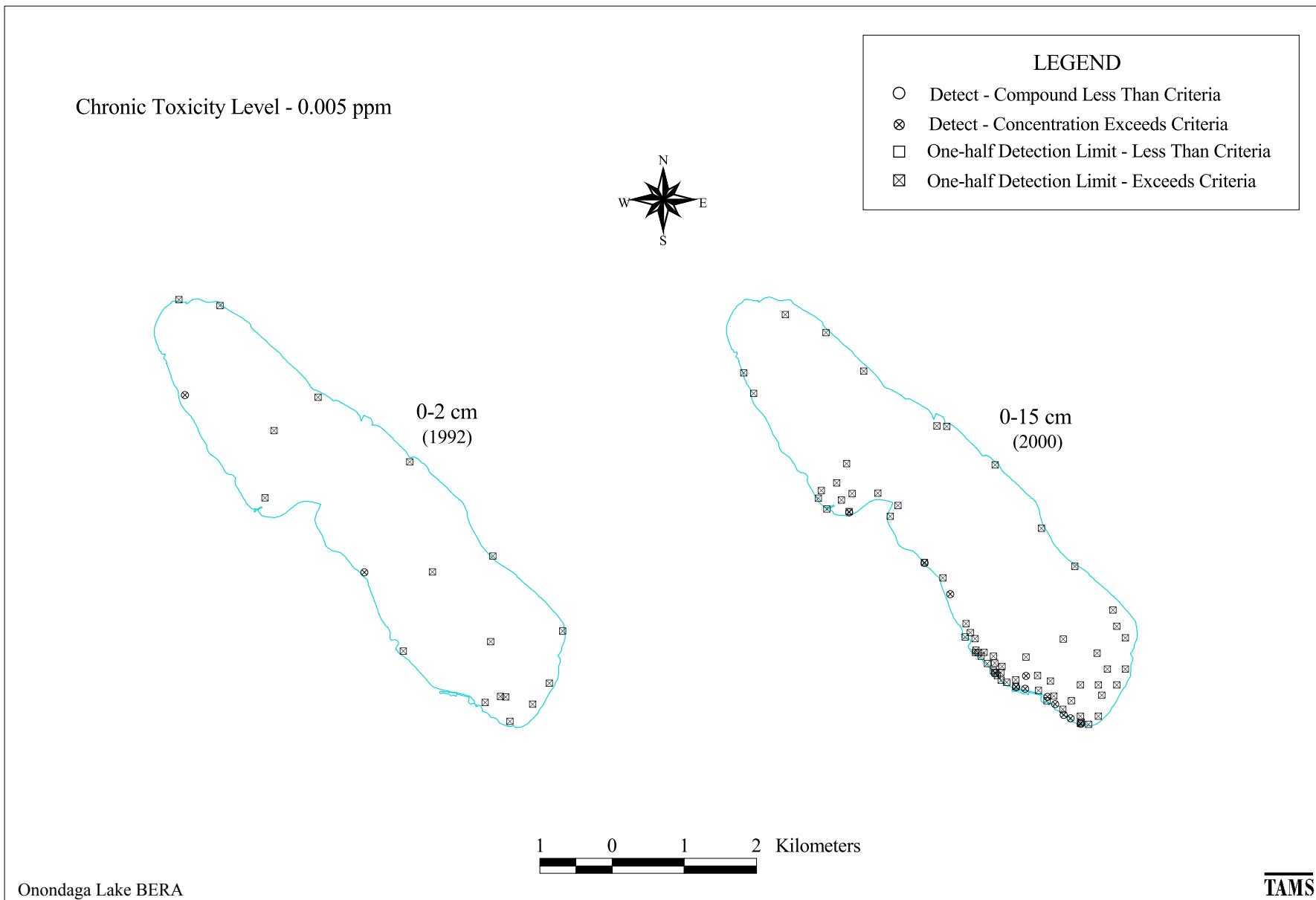


Figure E-37
Comparison of Phenols Sediment Concentrations with NYSDEC Screening Criteria

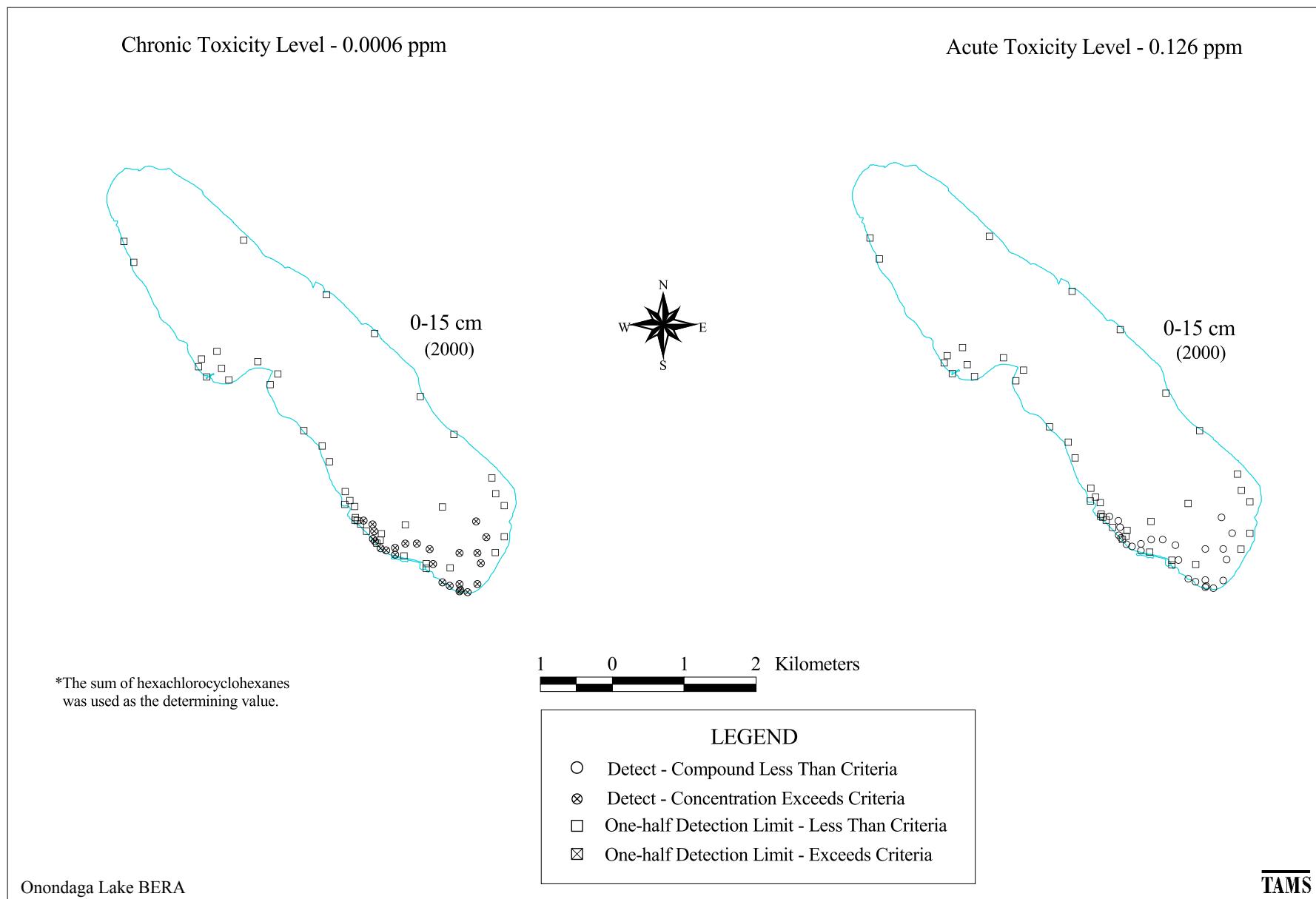
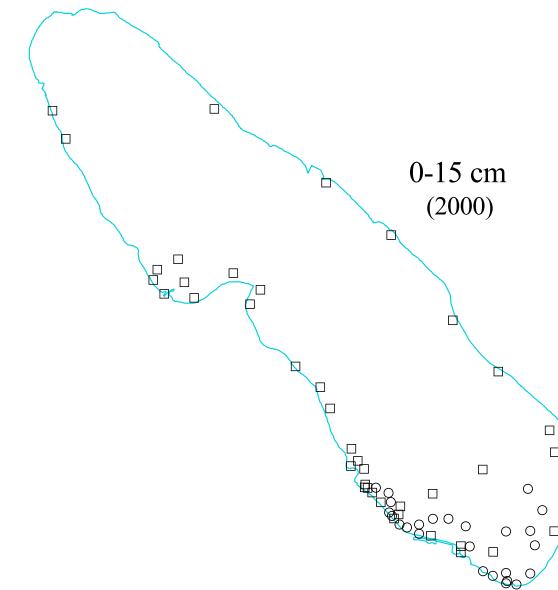


Figure E-38
Comparison of Hexachlorocyclohexanes Sediment Concentrations with NYSDEC Screening Criteria

Wildlife Bioaccumulation Level - 0.015 ppm

LEGEND

- Detect - Compound Less Than Criteria
- ⊗ Detect - Concentration Exceeds Criteria
- One-half Detection Limit - Less Than Criteria
- ☒ One-half Detection Limit - Exceeds Criteria



*The sum of hexachlorocyclohexanes
was used as the determining value.

1 0 1 2 Kilometers

Onondaga Lake BERA

TAMS

Figure E-39
Comparison of Hexachlorocyclohexanes Sediment Concentrations
with NYSDEC Wildlife Bioaccumulation Screening Criteria

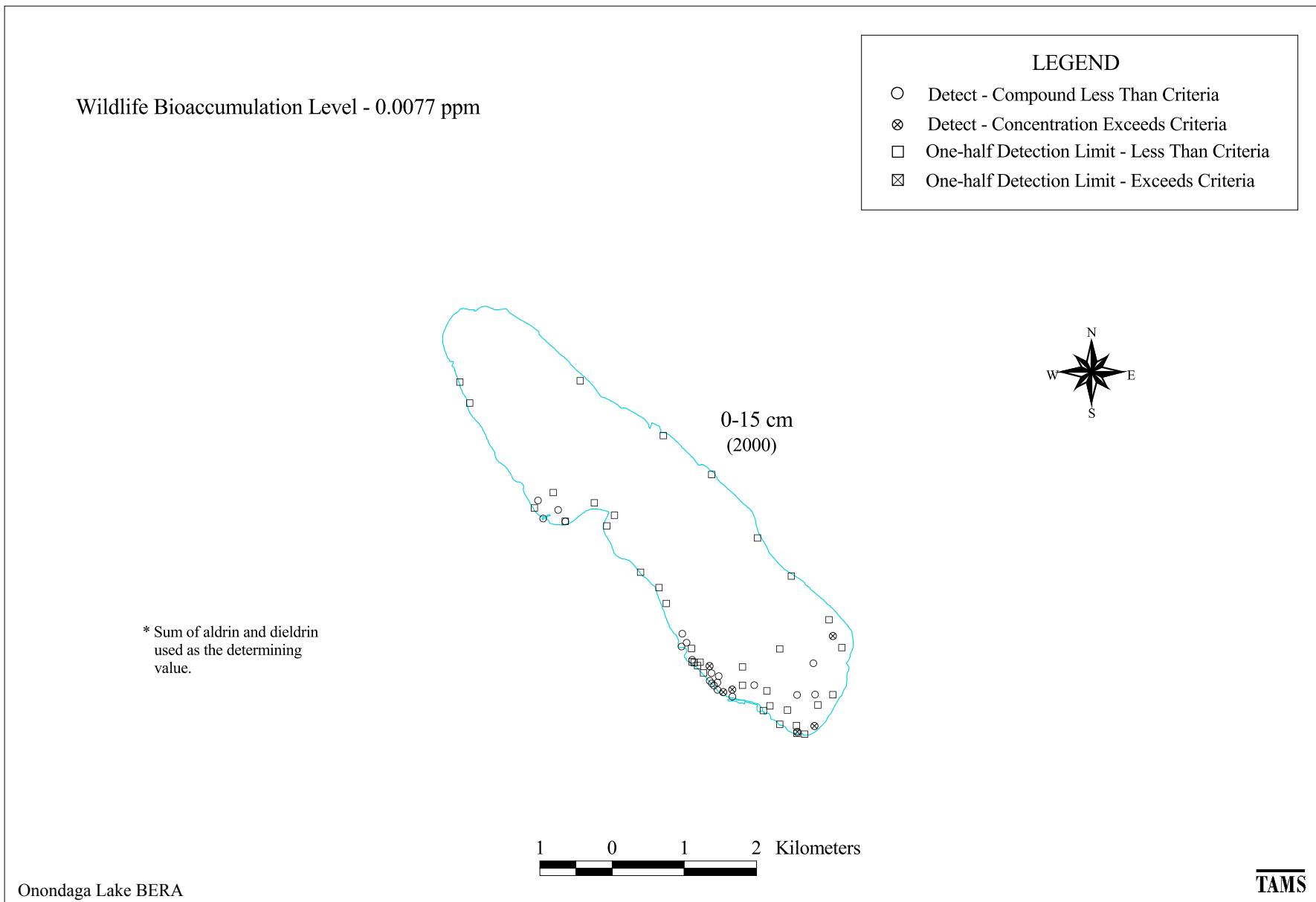


Figure E-40
Comparison of Aldrin and Dieldrin Sediment Concentrations
with NYSDEC Wildlife Bioaccumulation Screening Criteria

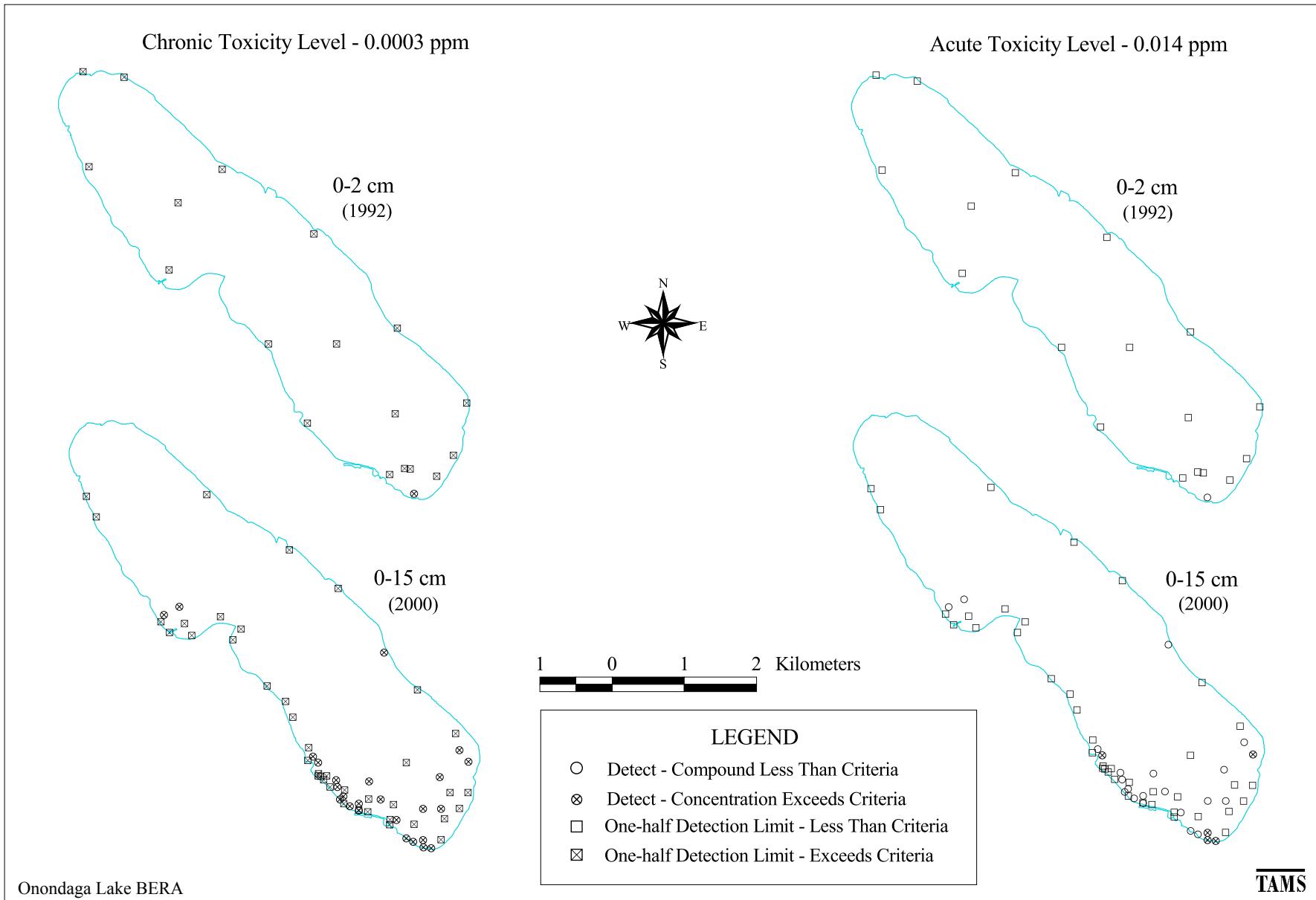


Figure E-41
Comparison of Chlordane Sediment Concentrations with NYSDEC Screening Criteria

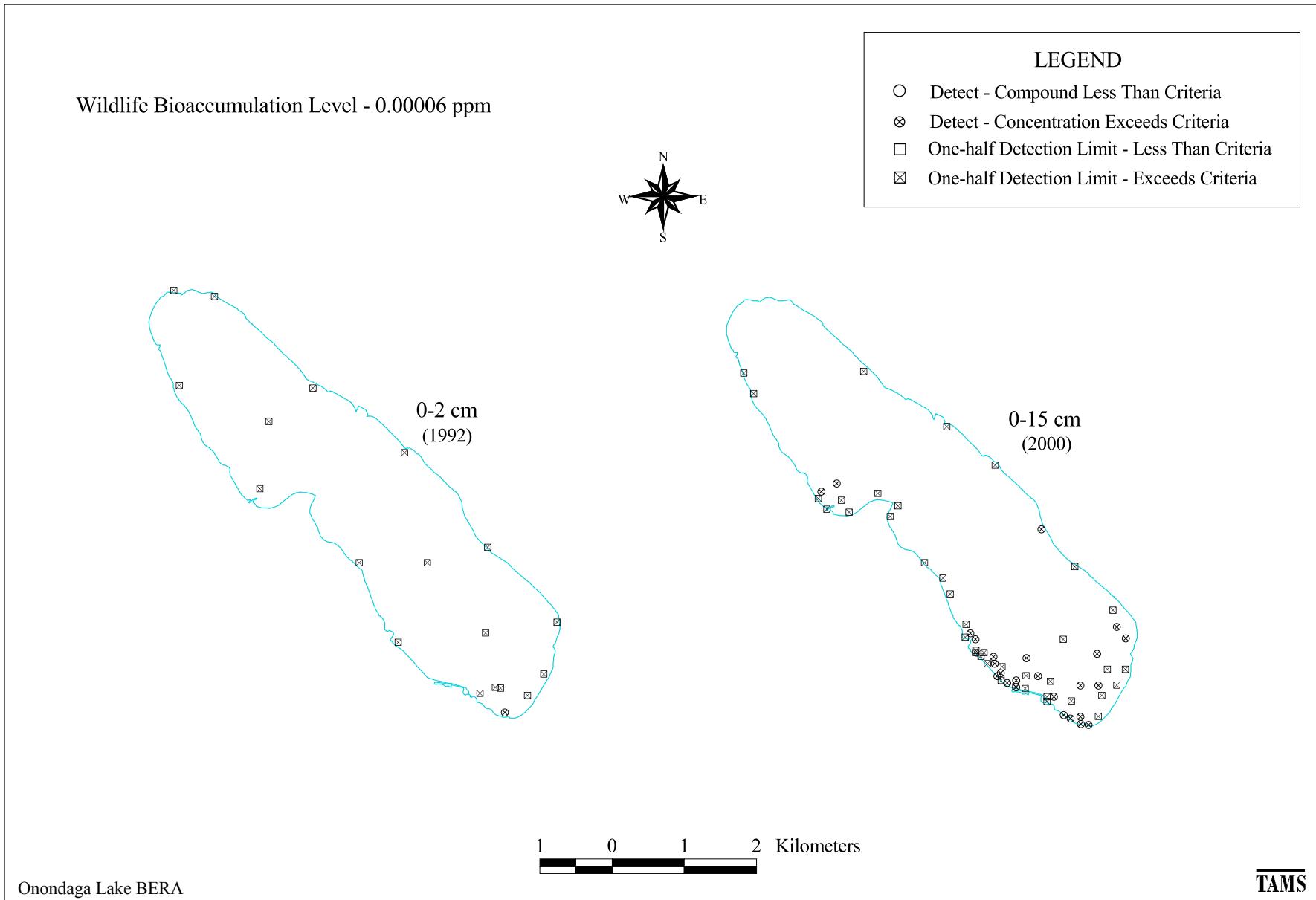


Figure E-42
Comparison of Chlordane Sediment Concentrations
with NYSDEC Wildlife Bioaccumulation Screening Criteria

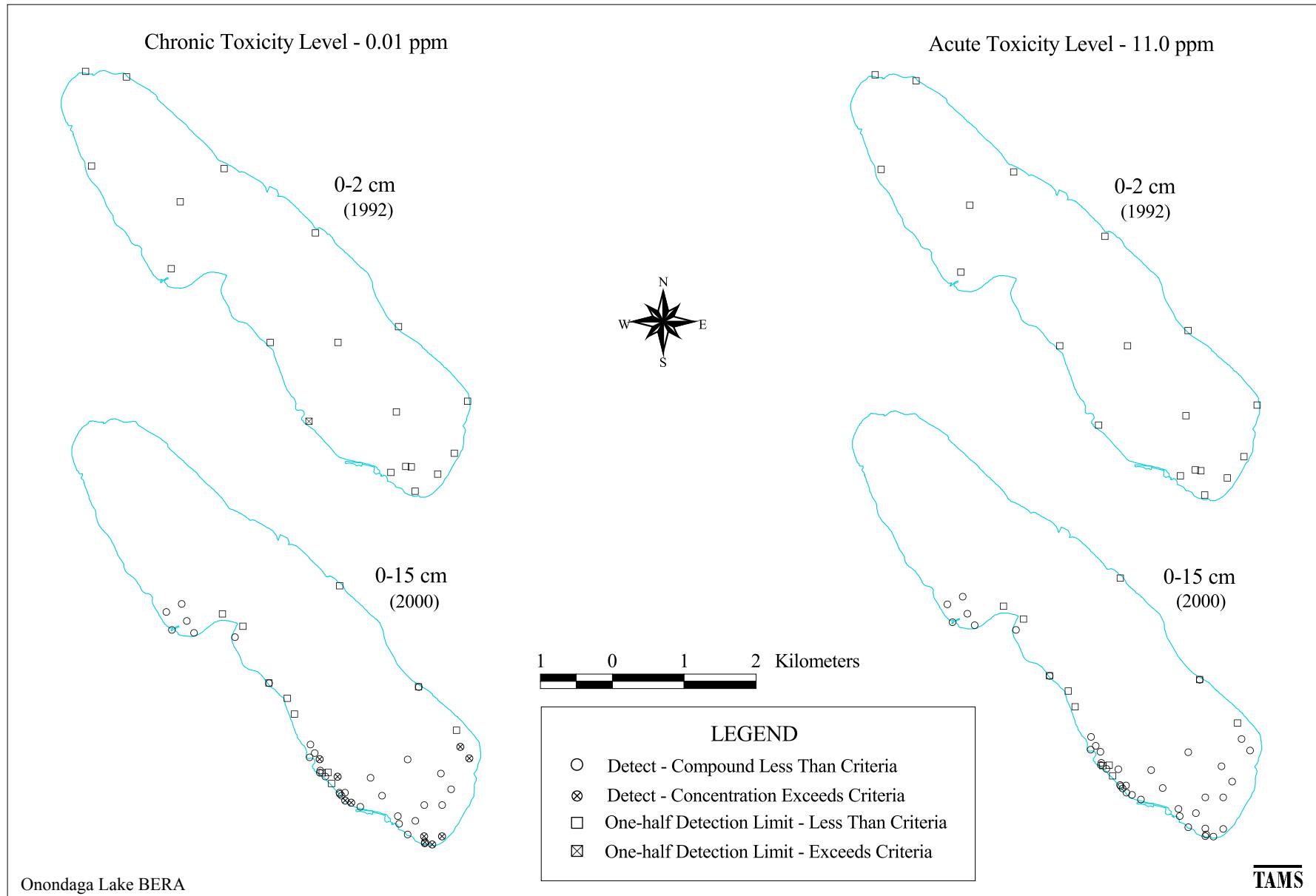


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Comparison of 4,4'-DDT Sediment Concentrations with NYSDEC Screening Criteria

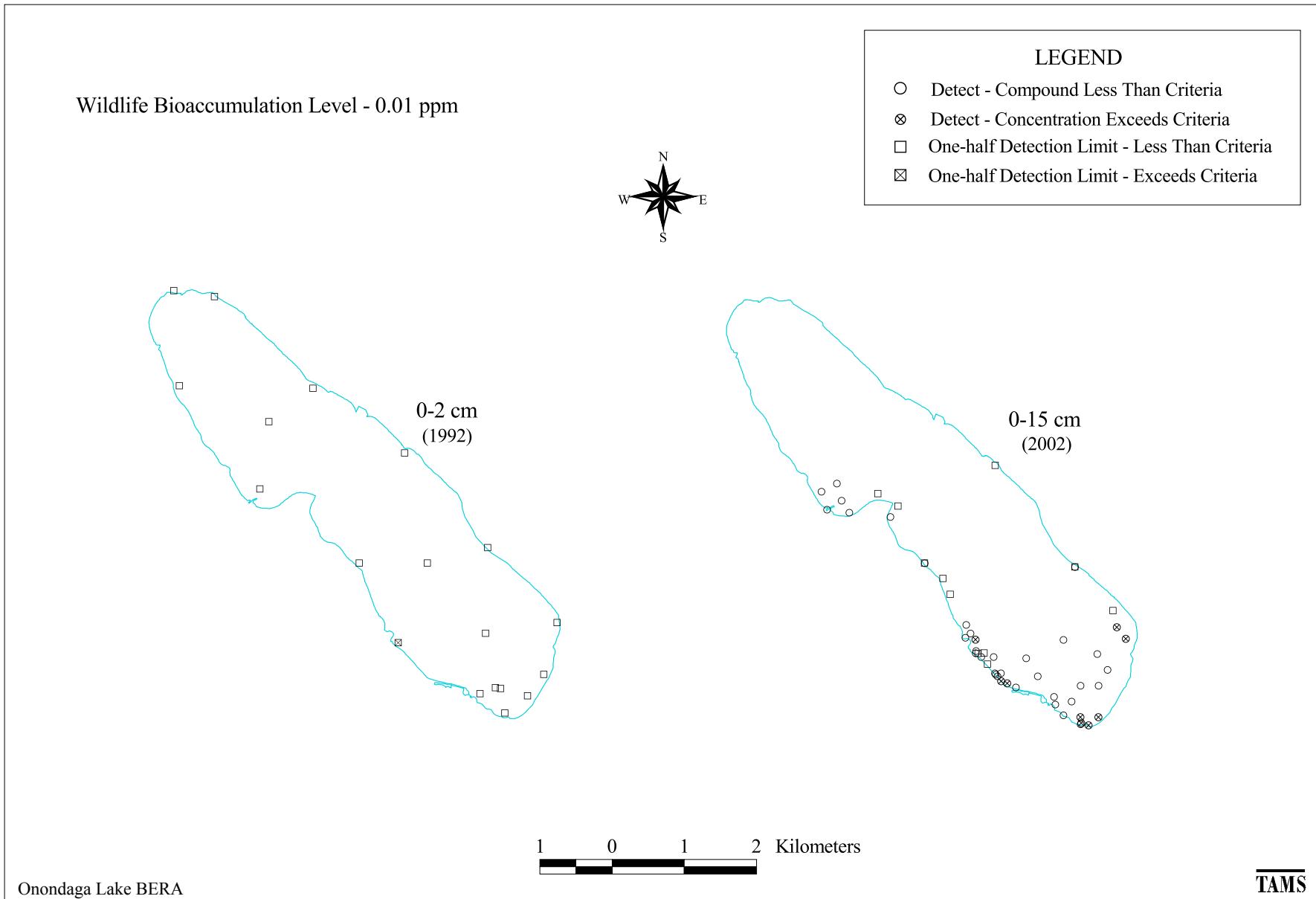


Figure E-44
Comparison of 4,4'-DDT Sediment Concentrations
with NYSDEC Wildlife Bioaccumulation Screening Criteria

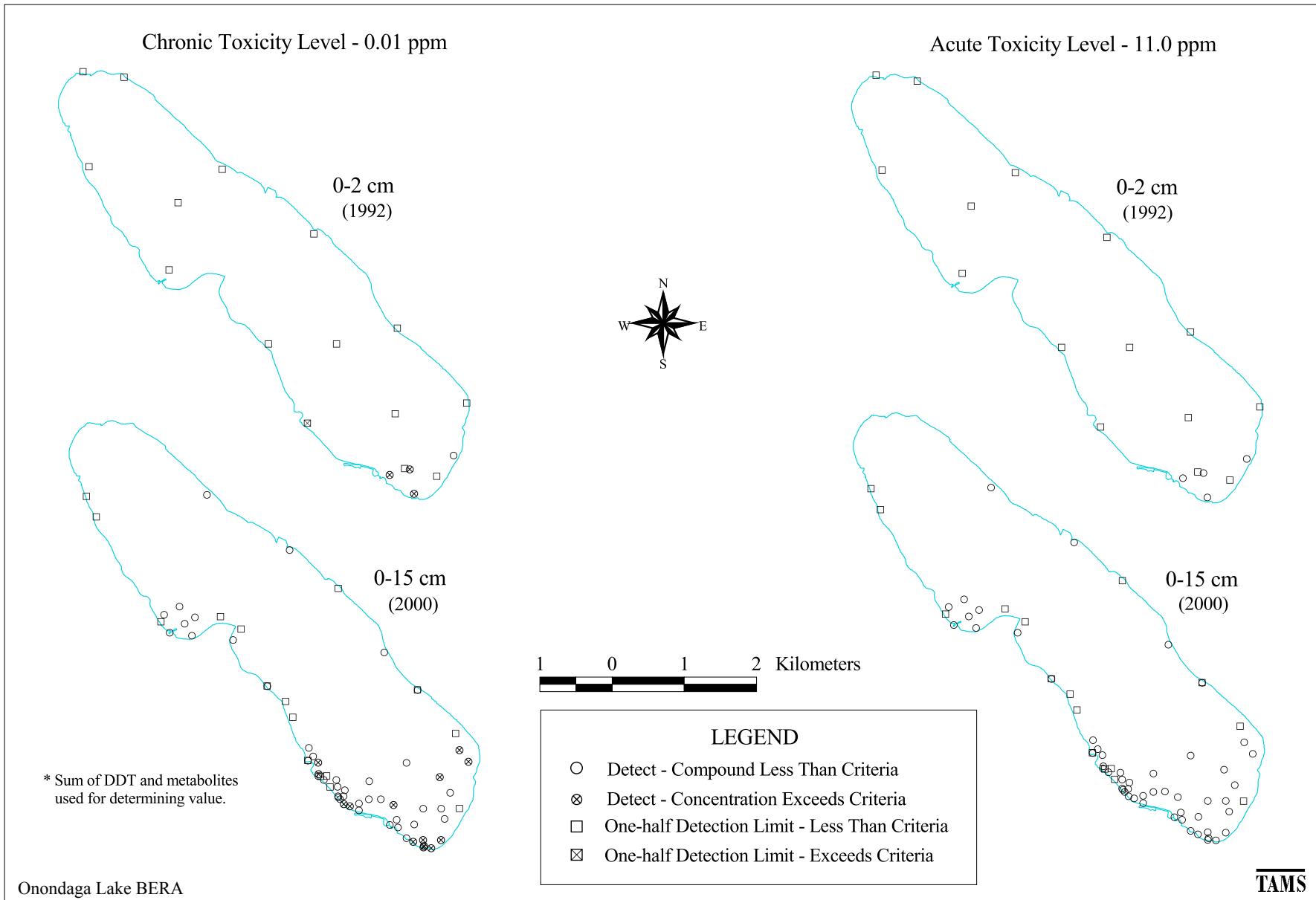


Figure E-45
Comparison of DDT and Metabolites Sediment Concentrations with NYSDEC Screening Criteria

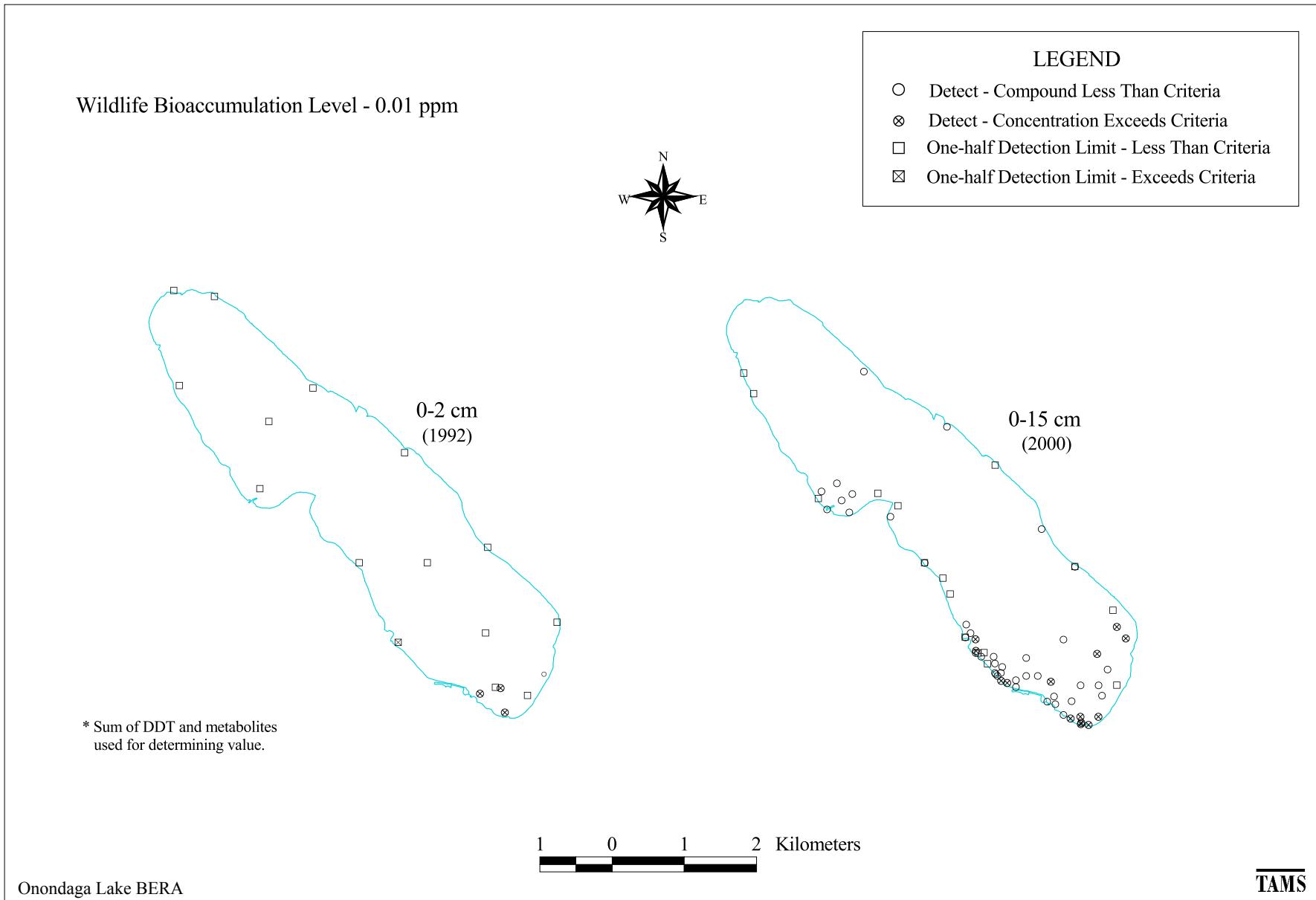


Figure E-46
Comparison of DDT and Metabolites Sediment Concentrations
with NYSDEC Wildlife Bioaccumulation Screening Criteria

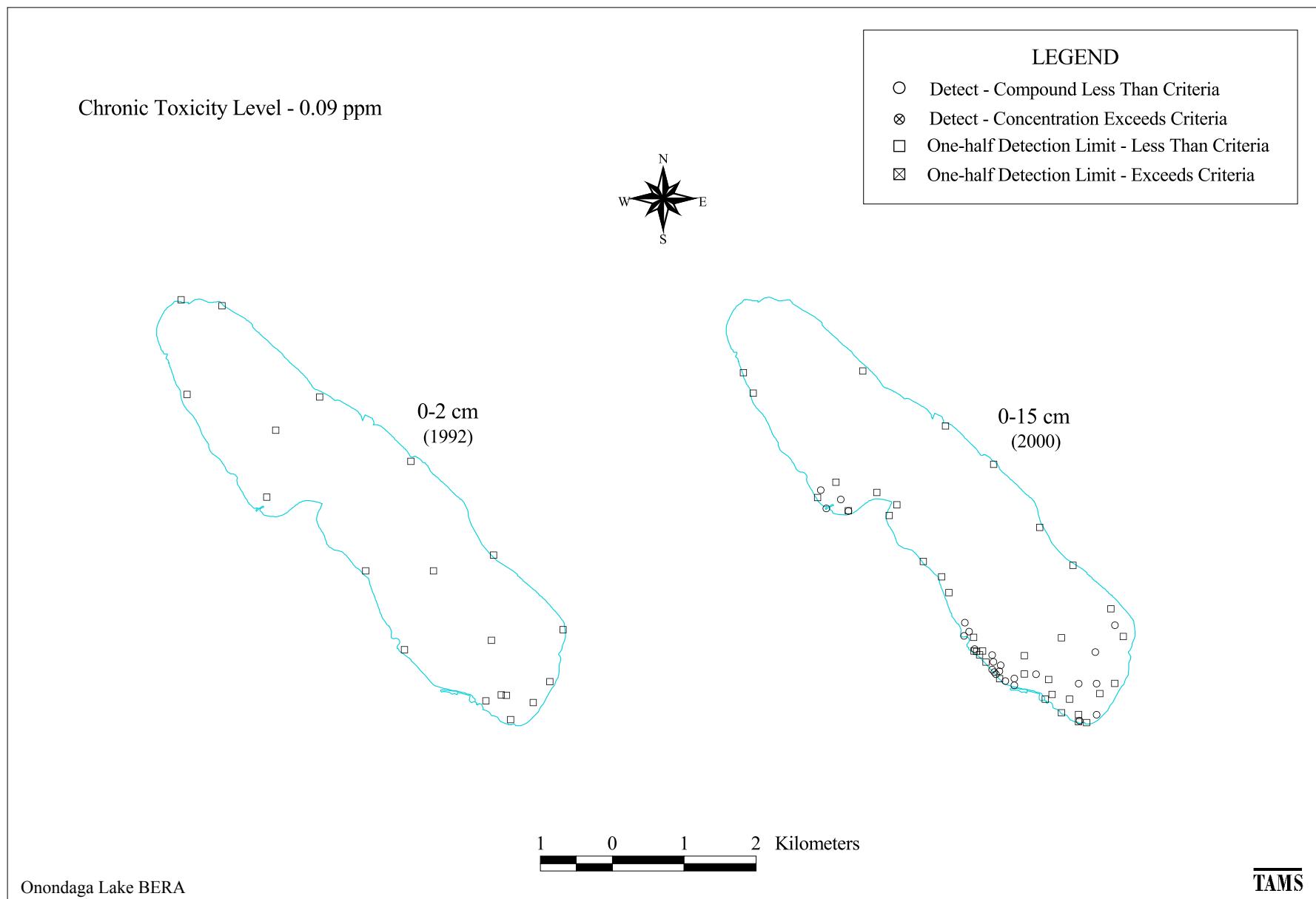


Figure E-47
Comparison of Dieldrin Sediment Concentrations with NYSDEC Screening Criteria

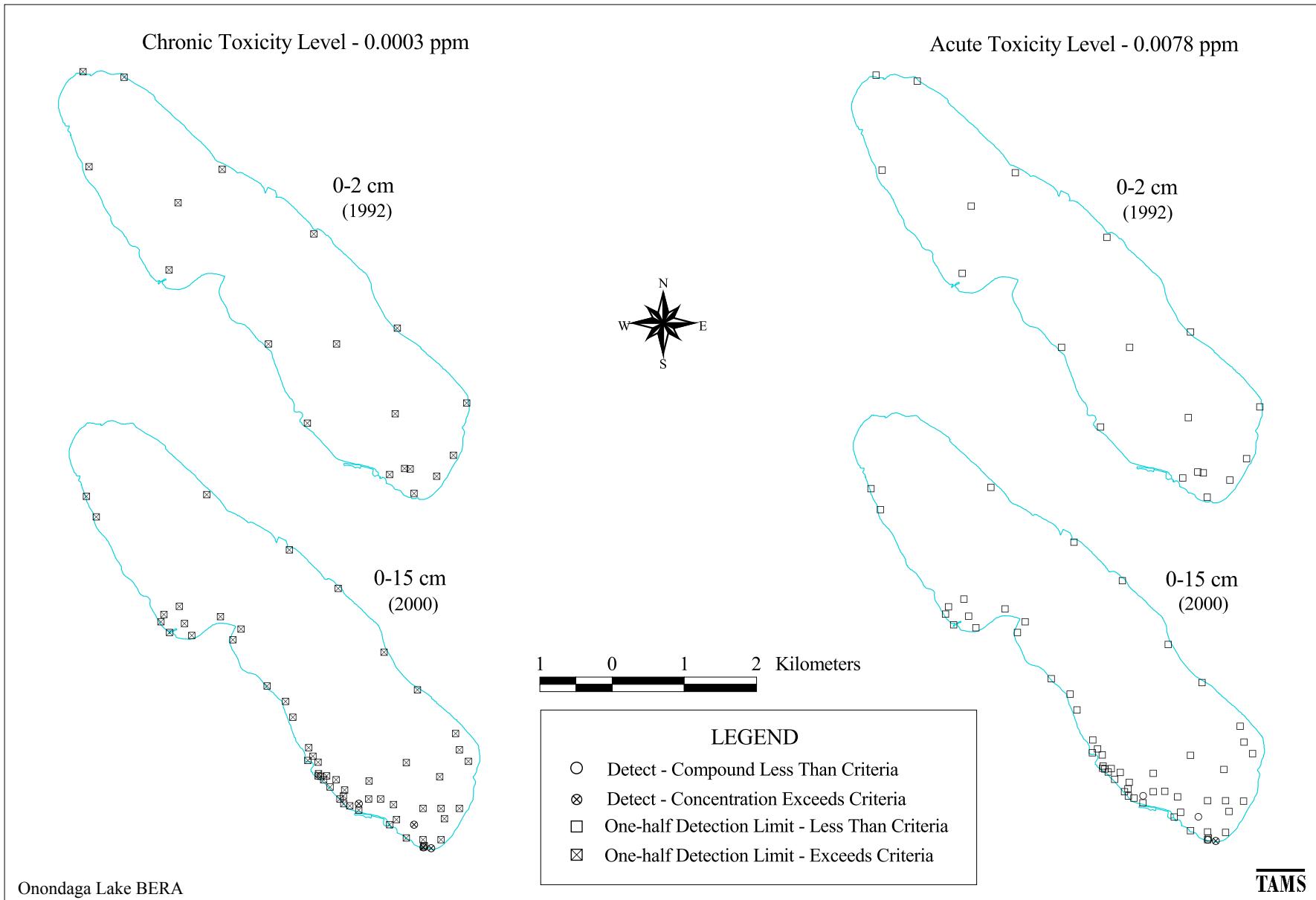


Figure E-48
Comparison of Endosulfan I Sediment Concentrations with NYSDEC Screening Criteria

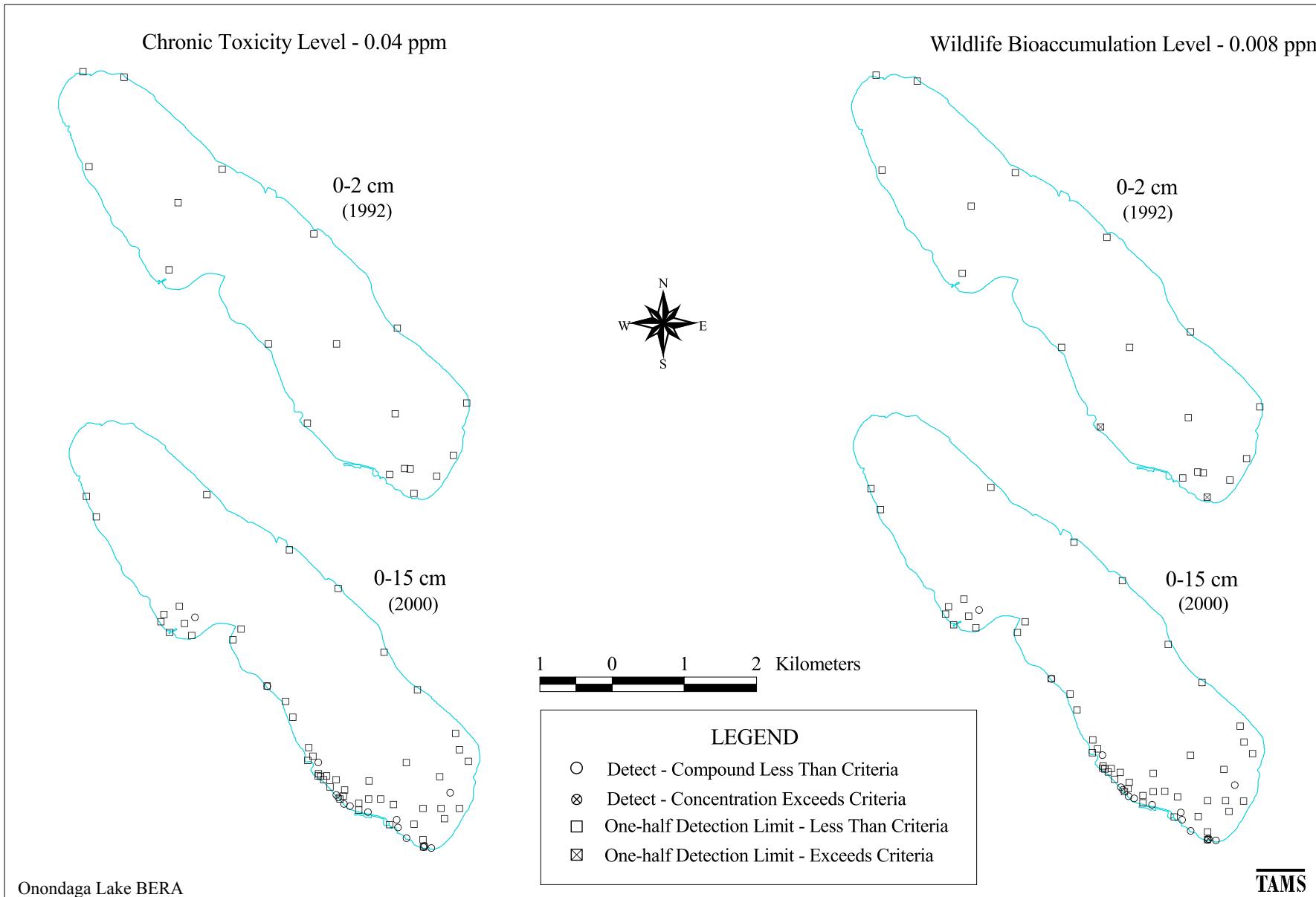


Figure E-49
**Comparison of Endrin Sediment Concentrations with NYSDEC Chronic Toxicity
 and Wildlife Bioaccumulation Screening Criteria**

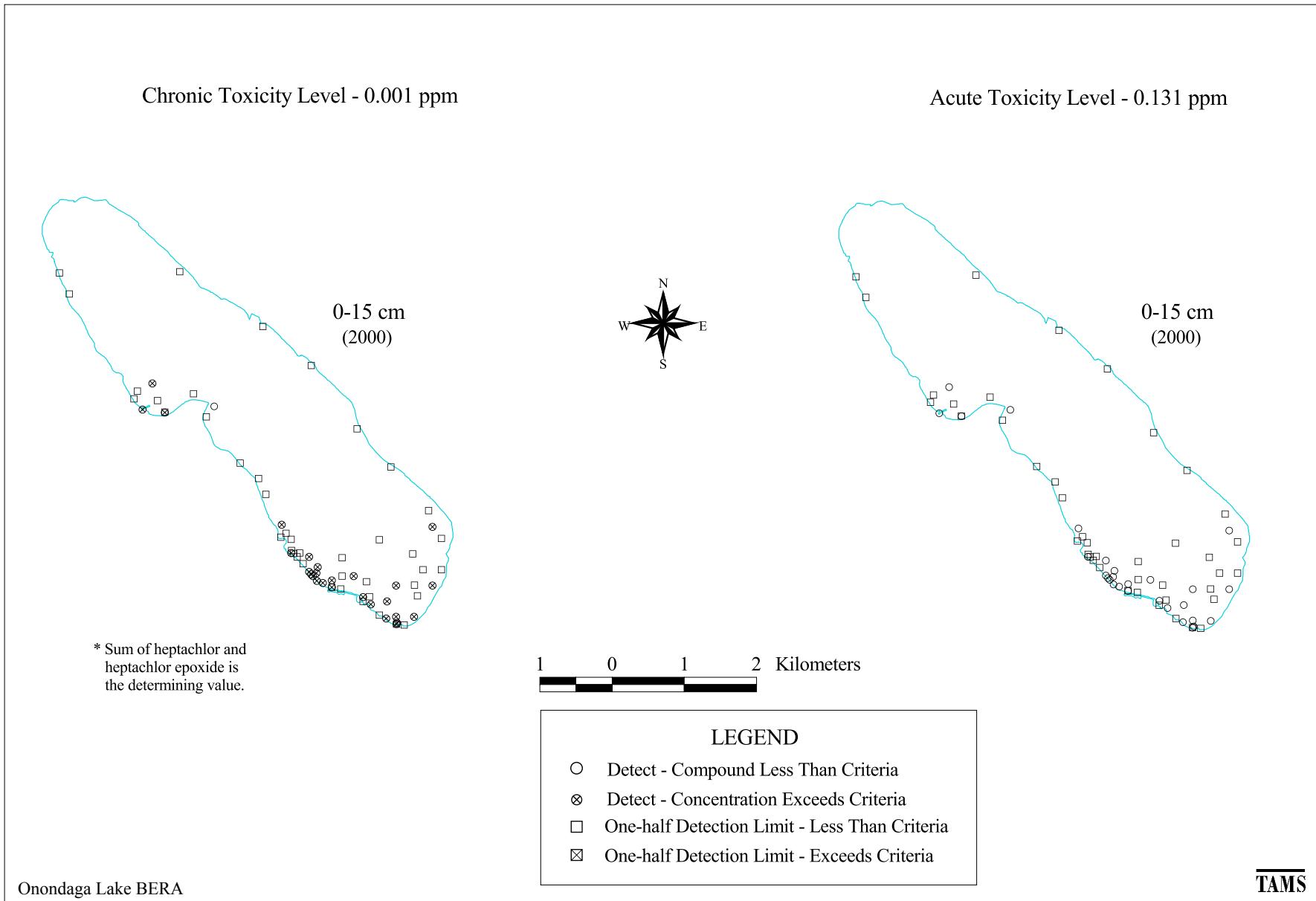


Figure E-50
Comparison of Heptachlor and Heptachlor Epoxide Sediment Concentrations
with NYSDEC Screening Criteria

TAMS

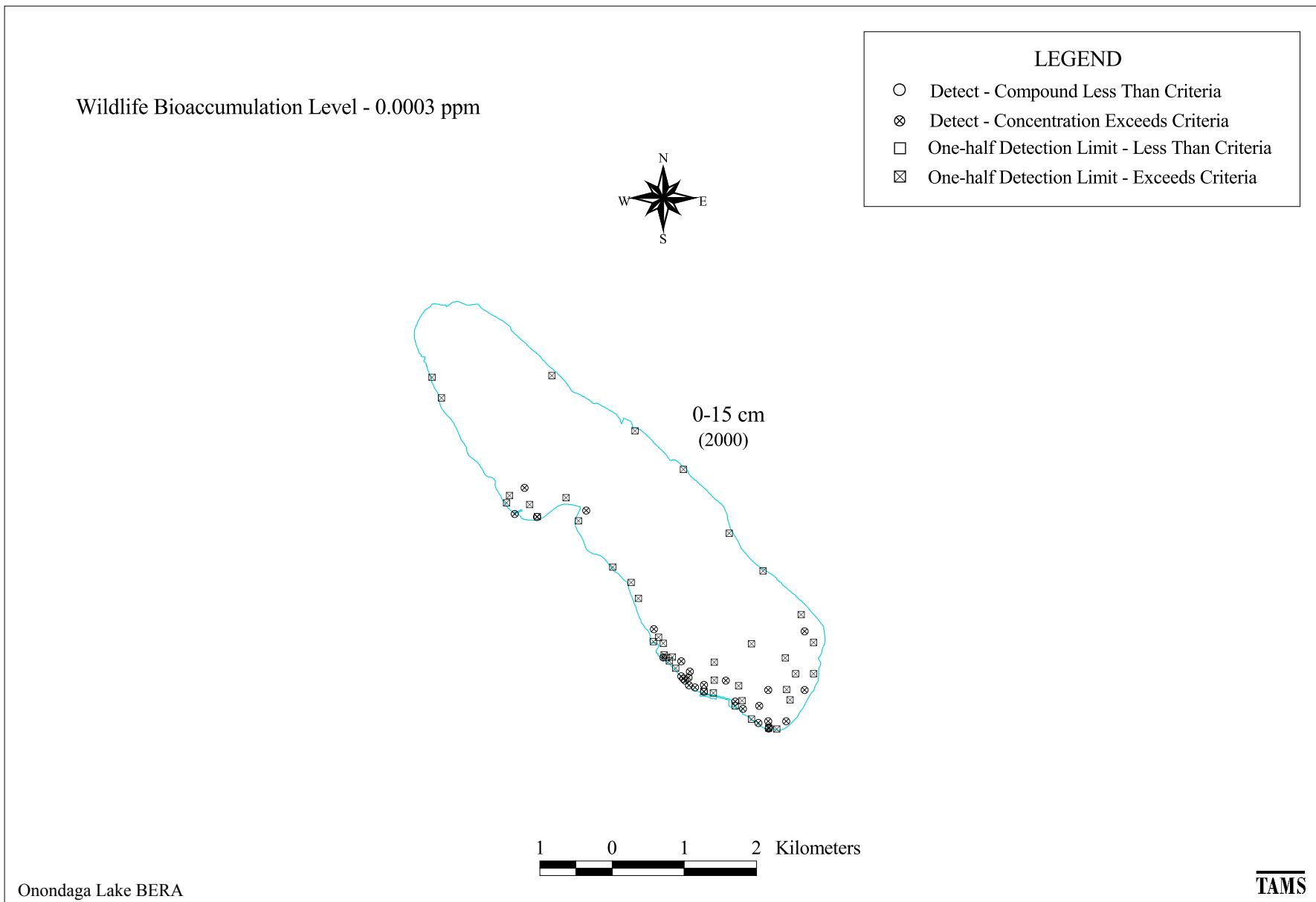


Figure E-51
Comparison of Heptachlor and Heptachlor Epoxide Sediment Concentrations with
NYSDEC Wildlife Bioaccumulation Screening Criteria

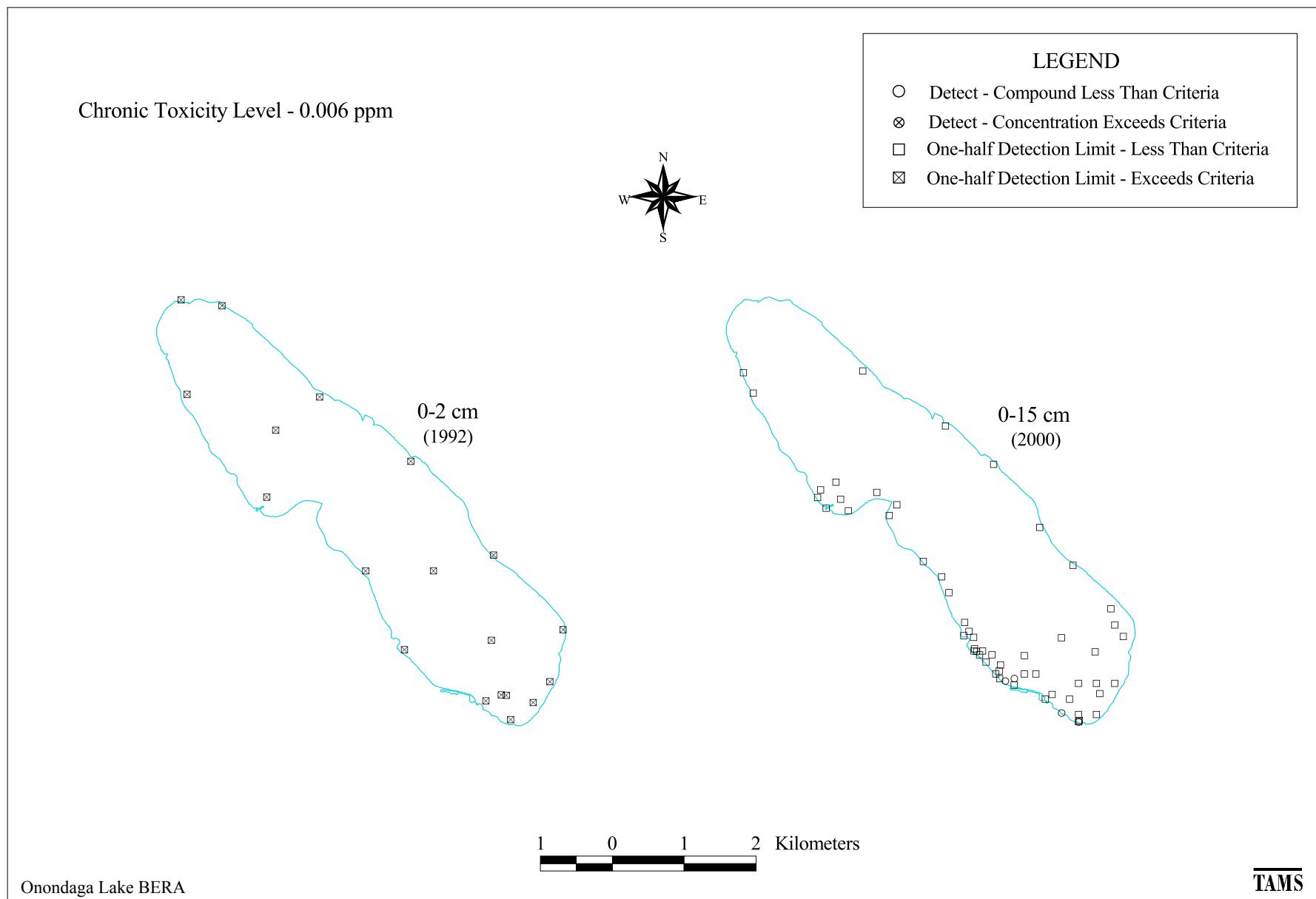


Figure E-52
Comparison of Methoxychlor Sediment Concentrations with NYSDEC Screening Criteria

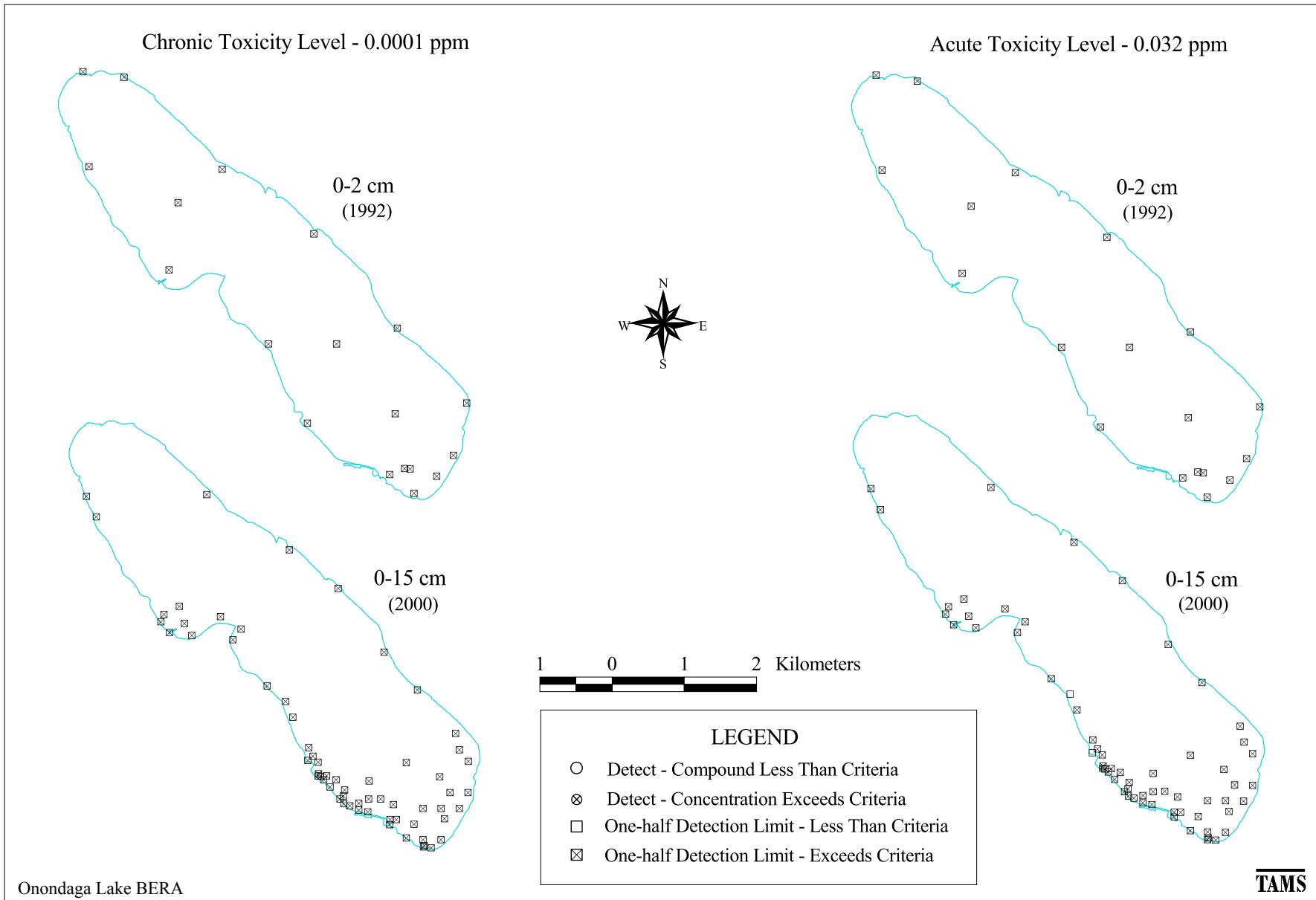


Figure E-53
Comparison of Toxaphene Sediment Concentrations with NYSDEC Screening Criteria

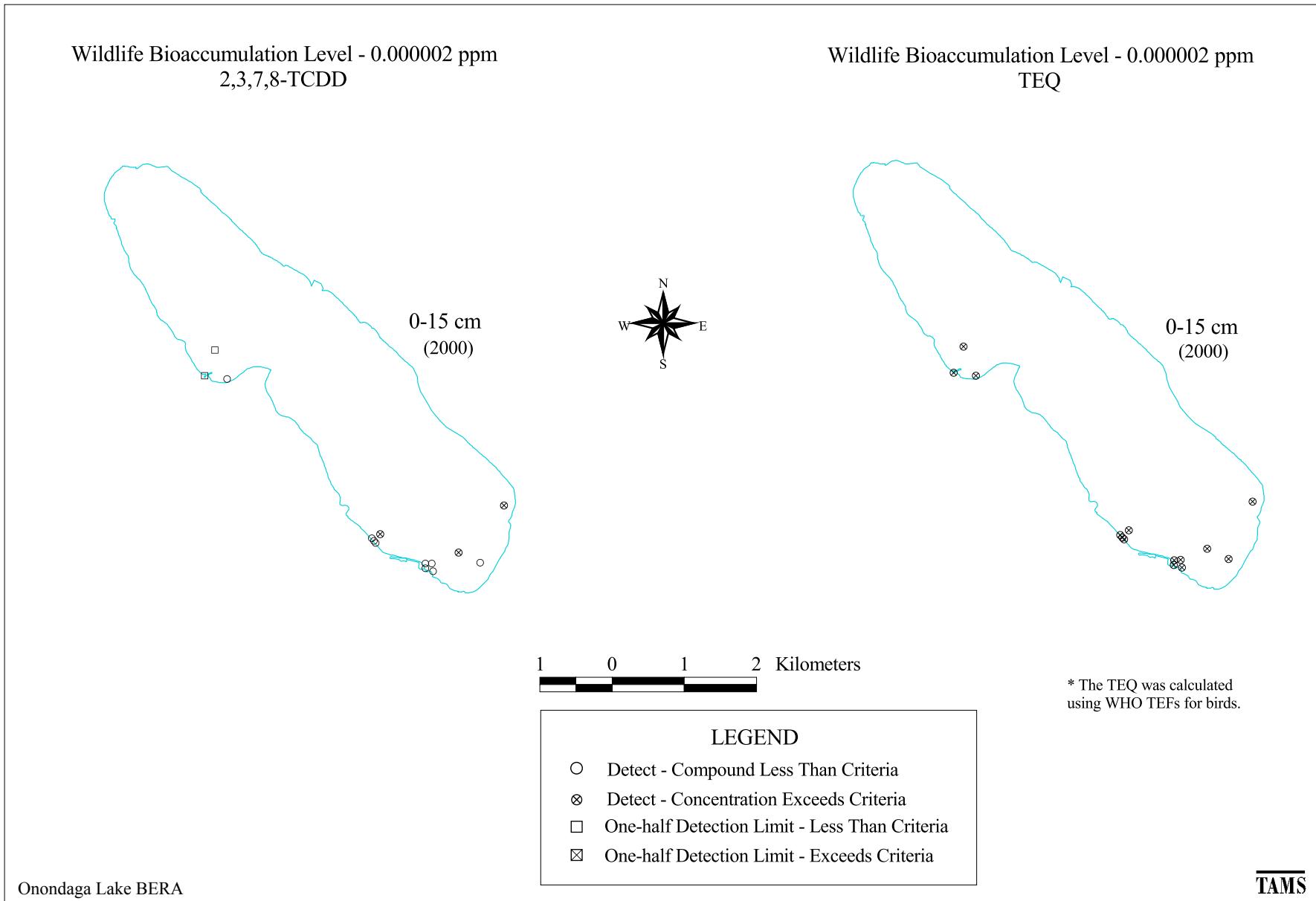


Figure E-54
Comparison of 2,3,7,8-TCDD and TEQ Sediment Concentrations with
NYSDEC Wildlife Bioaccumulation Screening Criteria