# Watershe

Mercury is a toxic metal that conta
ute the majority of emissions. Mer
where they are deposited across th

# d Mapping of F

minates all aquatic ecosystems above pre-industrial levels. (AM

cury is emitted into the atmosphere as elemental mercury, a re

he landscape. Once this inorganic  mercury  reaches aquatic sys

# ive Ponds in NW

**Ph.D. Student, Depart**

MAP 2021). Contamination of these systems extends into the A
latively non-toxic form. Once it reaches the atmosphere, this el
stems, it is methylated by bacteria within the water column. Th

# W Greenland for

Strang, Benjamin

tment of Biology, Texas Christian Unive

## Abstract

rctic, where the low temperatures favor deposition over re-em
lemental mercury can have a residence time of up to 1.5 years.
is methylated form, methylmercury, is highly bio-available and

# r Potential Merc

ersity, Fort Worth TX

ission into the atmosphere. While mercury is a naturally occur
This allows for contaminants to move far from their point-sou
l biomagnifies up trophic levels, potentially reaching toxic conc

# cury Contamina

rring element, anthropogenic sources like coal-fired power pla
rce of pollution. These contaminants leave the atmosphere du
centrations in predators (Burger & Gochfeld, 1997; Crump & Tr

# tion Risk

nts and artisanal gold mines contrib-
ring wet and dry deposition events,
rudeau, 2009). Because of this risk to

wildlife,, methylmercury concentra
contamination, understanding of w
tem exhibits the potential for high

The objective of this pro
tamination for five pon
sessment was formed b
area ratio. Ponds with l

**Figure 1: Dispropo**

ations within biota need to be monitored to determine where w
watershed drainage area : pond area will help determine which
er mercury concentrations. These determinations were based

## Objective

oject was to establish  risk of mercury con-
ds in Northwest Greenland . This risk as-
by determining the watershed area: pond
arger ratios are more likely to experience

## portionate Mercury Contamination

mission  Anthropogenic mercury deposition

wildlife may be at risk. Monitoring mercury, however, comes wi
aquatic systems may be receiving higher mercury loads. Becau
on watershed area : pond area, as higher ratios are likely to cor

## Metho

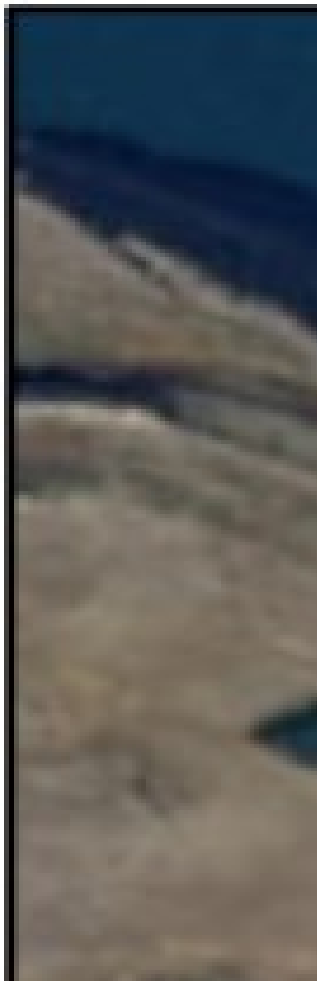
Inorganic mercury that is deposited
comes methylated within aquatic sy
is evenly distributed across the land
have higher potential for mercury lo
bodies.

Five watersheds were used for anal

th inherent challenges. Mercury contamination can vary spatia
use of its isolated location, Northwest Greenland has little data
ntribute higher mercury concentrations within the system.

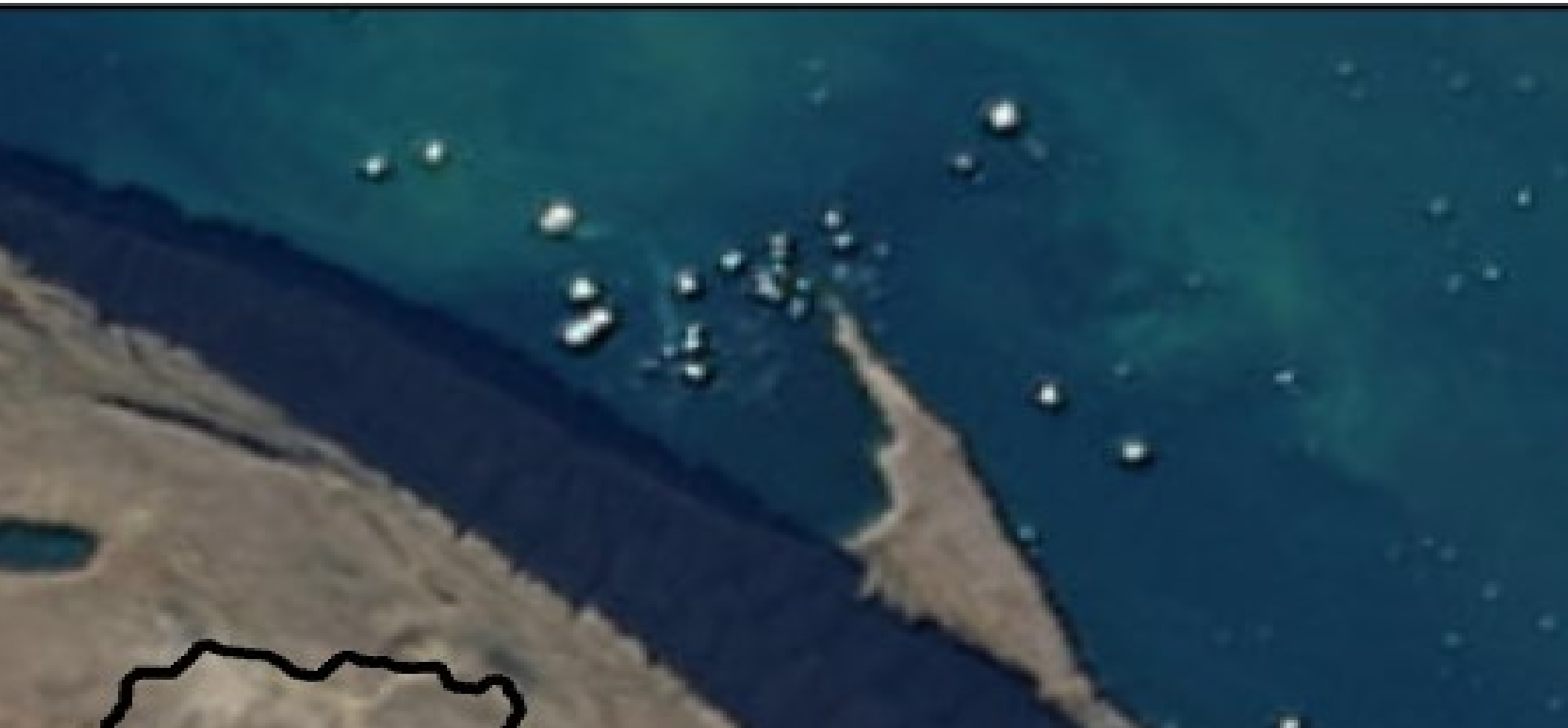
## ods

from the atmosphere be-
ystems. Because this mercury
lscape, larger watersheds
oading into terminal water-



ally between watersheds, with each watershed being associate
on mercury dynamics within freshwater lentic systems. Wate

Northwest Greenland Po



d with a different level of risk. To determine which watersheds
rshed mapping of five lentic systems in Northwest Greenland w

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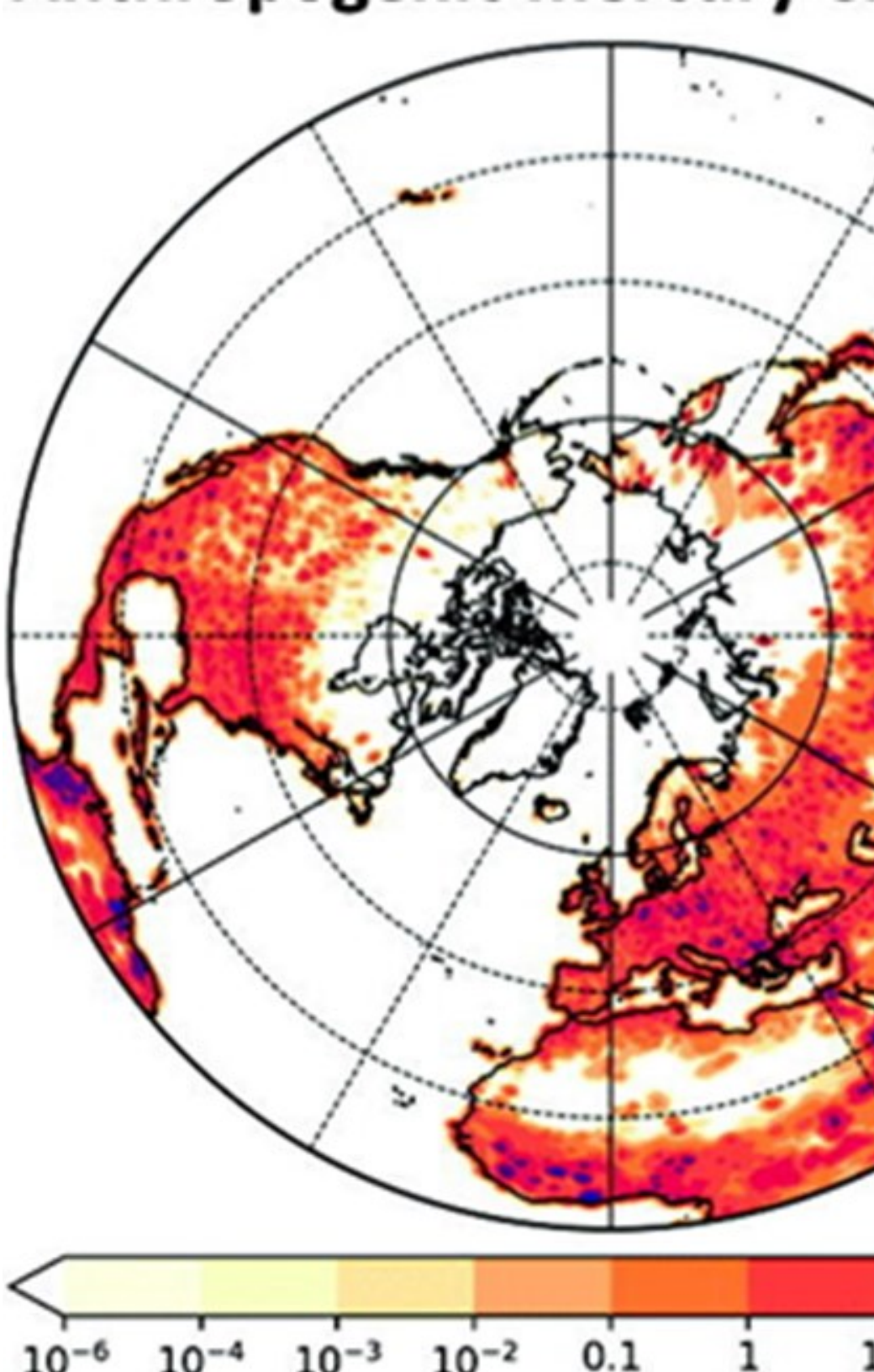
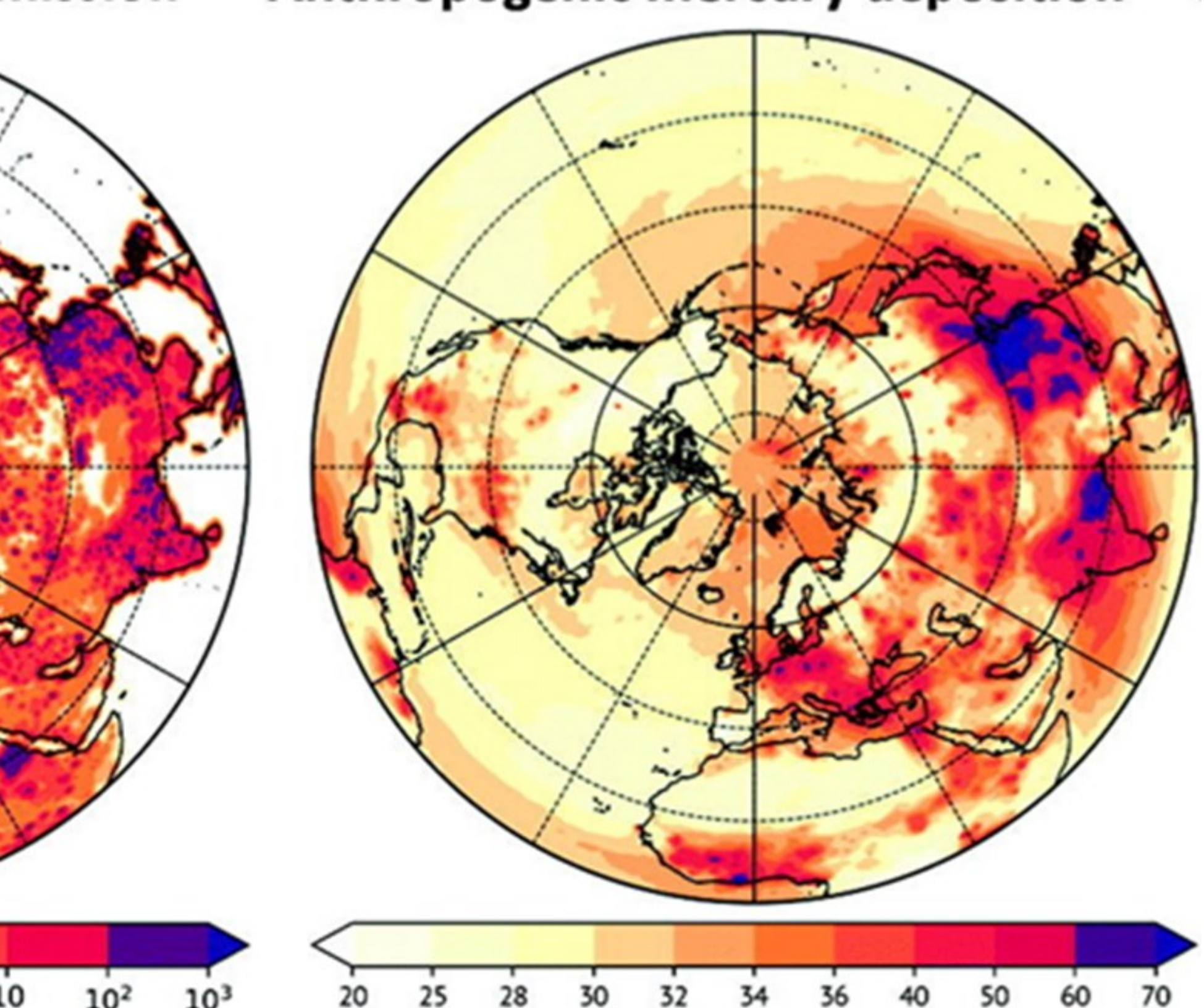
onds

may be at risk for higher mercury

vas performed to determine which sys-

ading Risk


$10^{-6}$
$10^{-4}$
$10^{-3}$
$10^{-2}$
0.1
1


10
$10^2$
$10^3$
20
25
28
30
32
34
36
40
50
60
70

Five watersheds were used for analy
shed along with the area of its termi
ing ArcGIS Pro mapping software. T
was divided by the area of each pon
for mercury loading into the system
are <2m average depth.

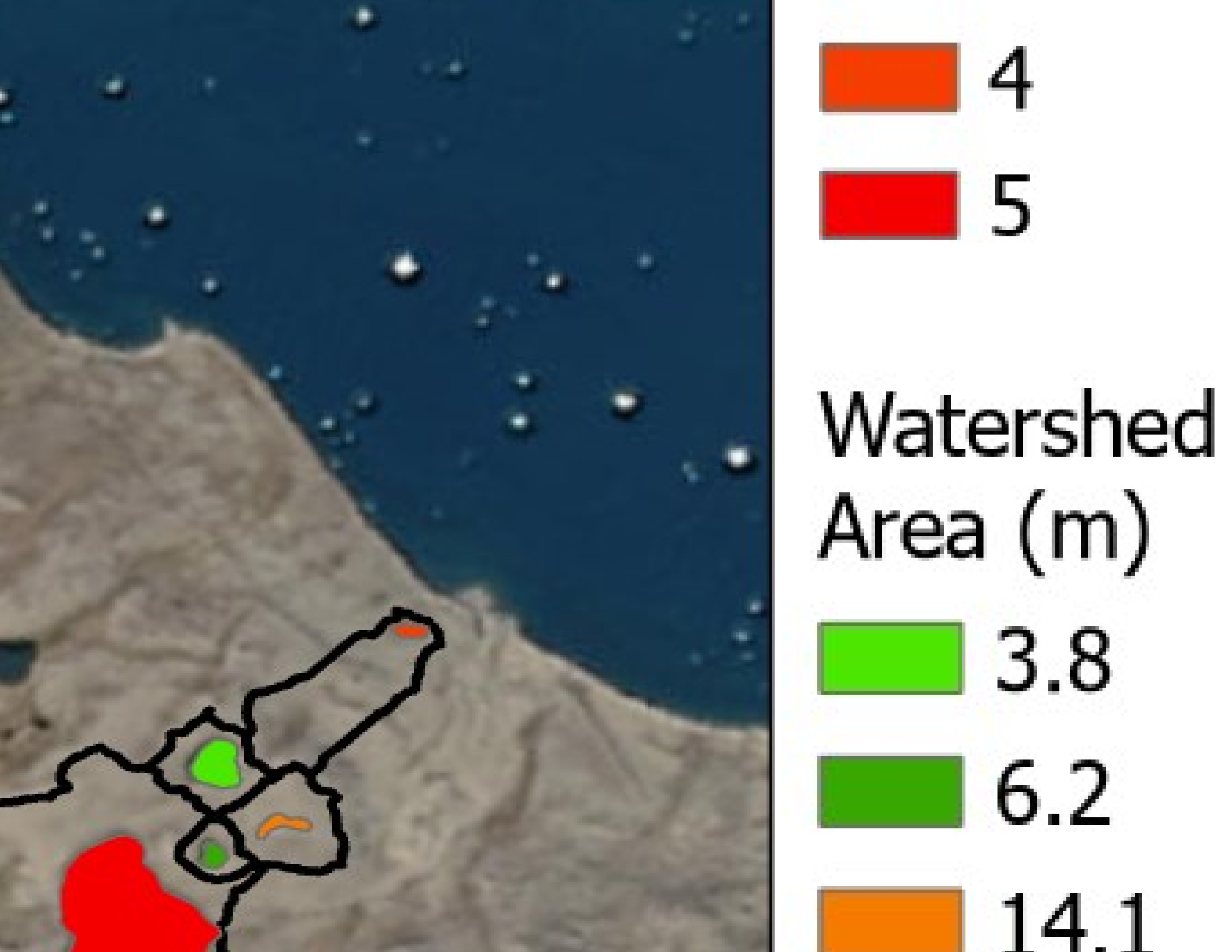
## Future Research & Map

. Due to complex matrix interference
centrations in water is inherently di

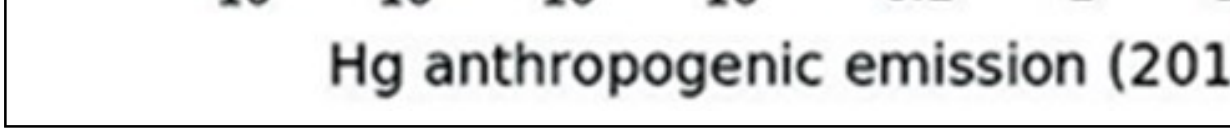
ysis. The area of each water-
inal pond was determined us-
he area of each watershed
d to determine the potential
. All ponds used in analysis

## pping Applicability

s, determining mercury con-
ifficult

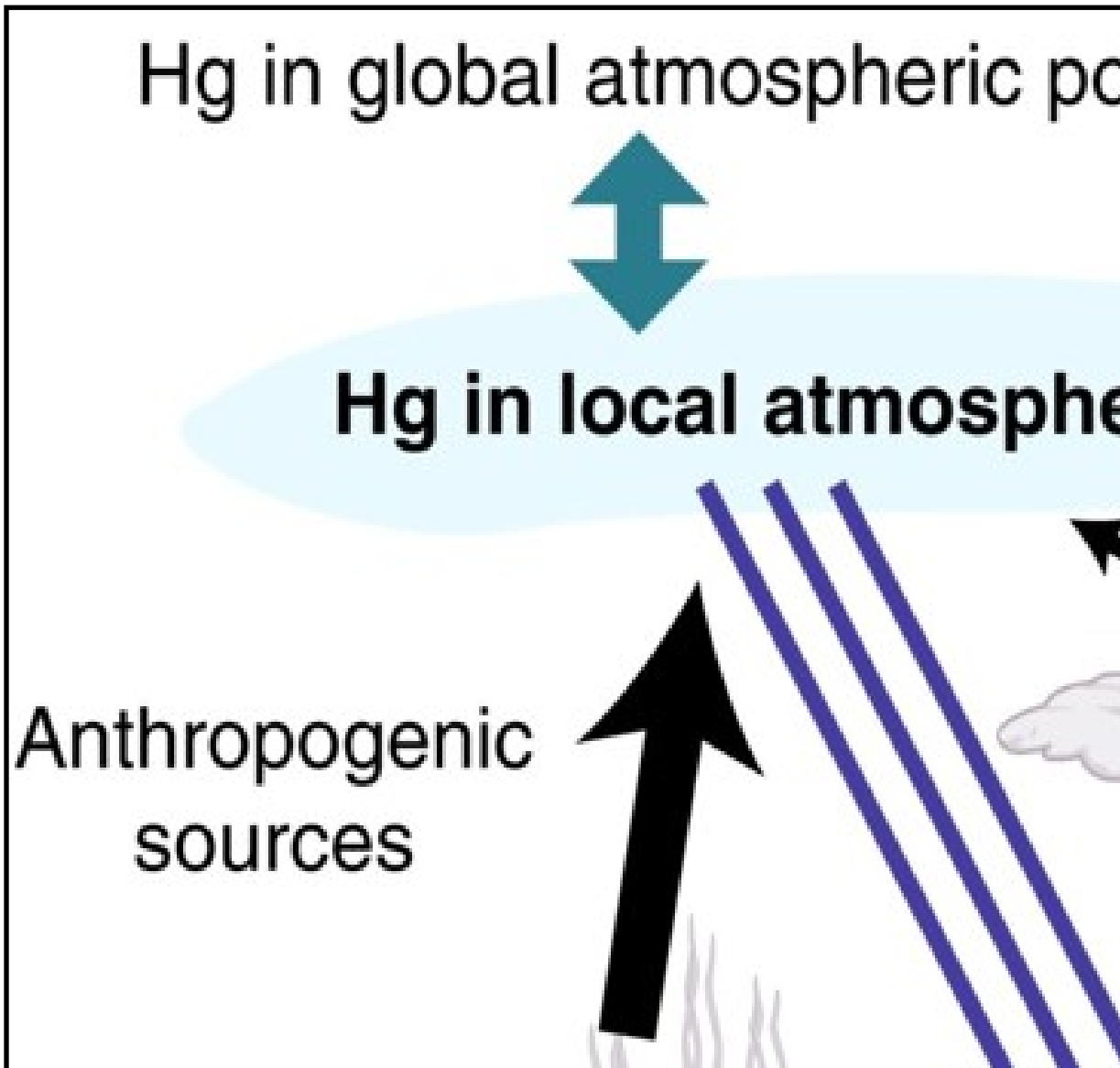

4
5
Watershed Area (m)
3.8
6.2
14.1

Area:Pond




(Dastoor, Wilson et al. 2022)

# Figur



5), µg/m²

Anthropogenic contribution to deposition, %

# re 2: Mercury Cycle

ool

ere

Natural sources

- Sampling biota that rely on these ac
  veal levels of contamination within

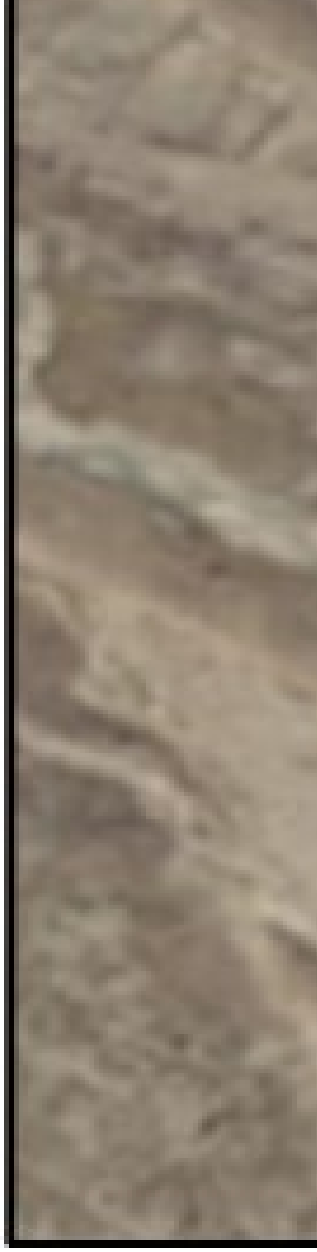
- Sentinel species are used to determ
  trations within systems.

- In Summer 2022, wolf spiders (*P. gl*
  ponds in the study area. Future mer
  will determine if there is a relations
  area ratios and mercury concentrat

quatic systems for food can re-
the system.

ine methylmercury concen-

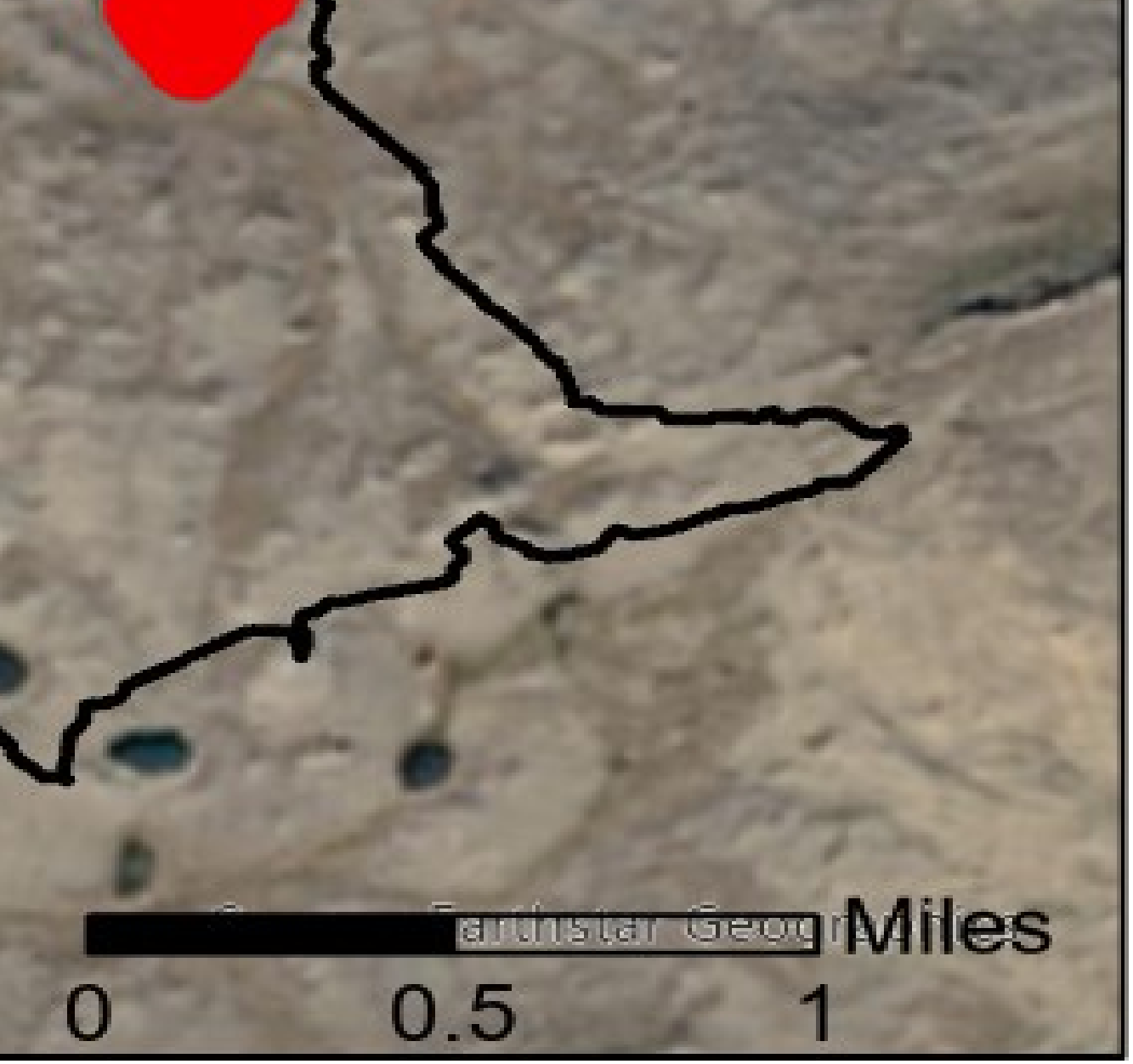
*acialis*) were collected from
rcury analysis of these spiders
ship between watershed: pond
ions in biota.



Five pon

## Resu

nds were mapped to determine their watershed boundaries. A



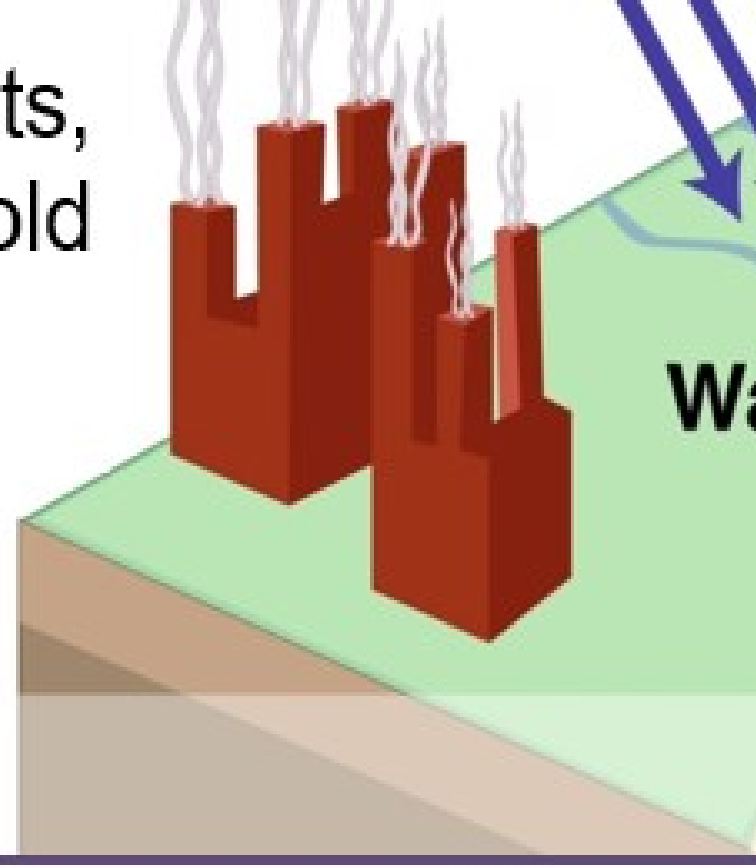

# ults and Discussion

Arctic freshwater systems are fed primarily from late Spring

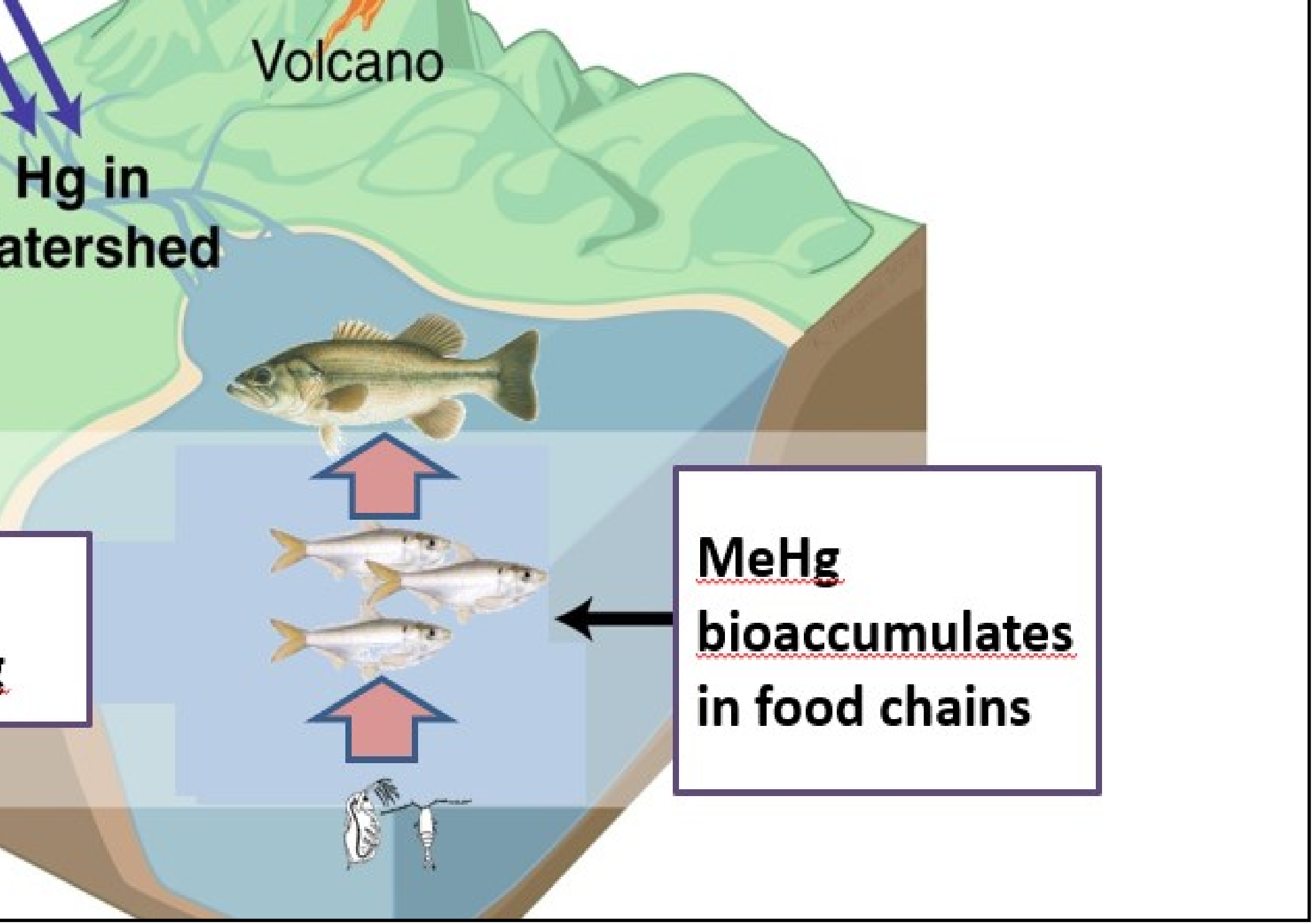
rshed Border

/ Summer snowmelt. The water-

Power plants,
Artisanal gold
mining



**In aquatic ecosystems,**
**IHg converted to MeHg**


Volcano
Hg in
atershed
MeHg
bioaccumulates
in food chains

# Figure 3: Stud

# dy Ponds

shed bou
these bo
ed in the
analysis

Waters
the hig
season
change

undaries shown determine the limit of snowmelt that drains
oundaries can potentially determine the extent of mercury lo
e water column is readily bio-available to organisms within t
for mercury exposure to biota can be made.

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shed:Pond area ratios may inform the potentia
gh Arctic is a rapidly changing landscape. These
ns (summers) and shorter winters. Monitoring
es in contaminant concentrations in biota, and

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into each pond. Because mercury deposits onto snow during
ading into these freshwater systems. Once mercury reaches t
he aquatic system and adjacent riparian areas. By mapping th

## Conclusion

l for mercury loading into aquatic systems. In re
e changes could alter watershed dynamics in re
these changes in watershed dynamics will prov
the subsequent risk to high trophic-level consu

g atmospheric deposition events,
these systems, it becomes methylat-
he watersheds, preliminary risk

esponse to climate change,
sponse to longer ice-free
vide insight into potential
mers.