1999 OHIO RIVER MOLLUSK KILL ASSESSMENT: THE GASTROPOD STORY

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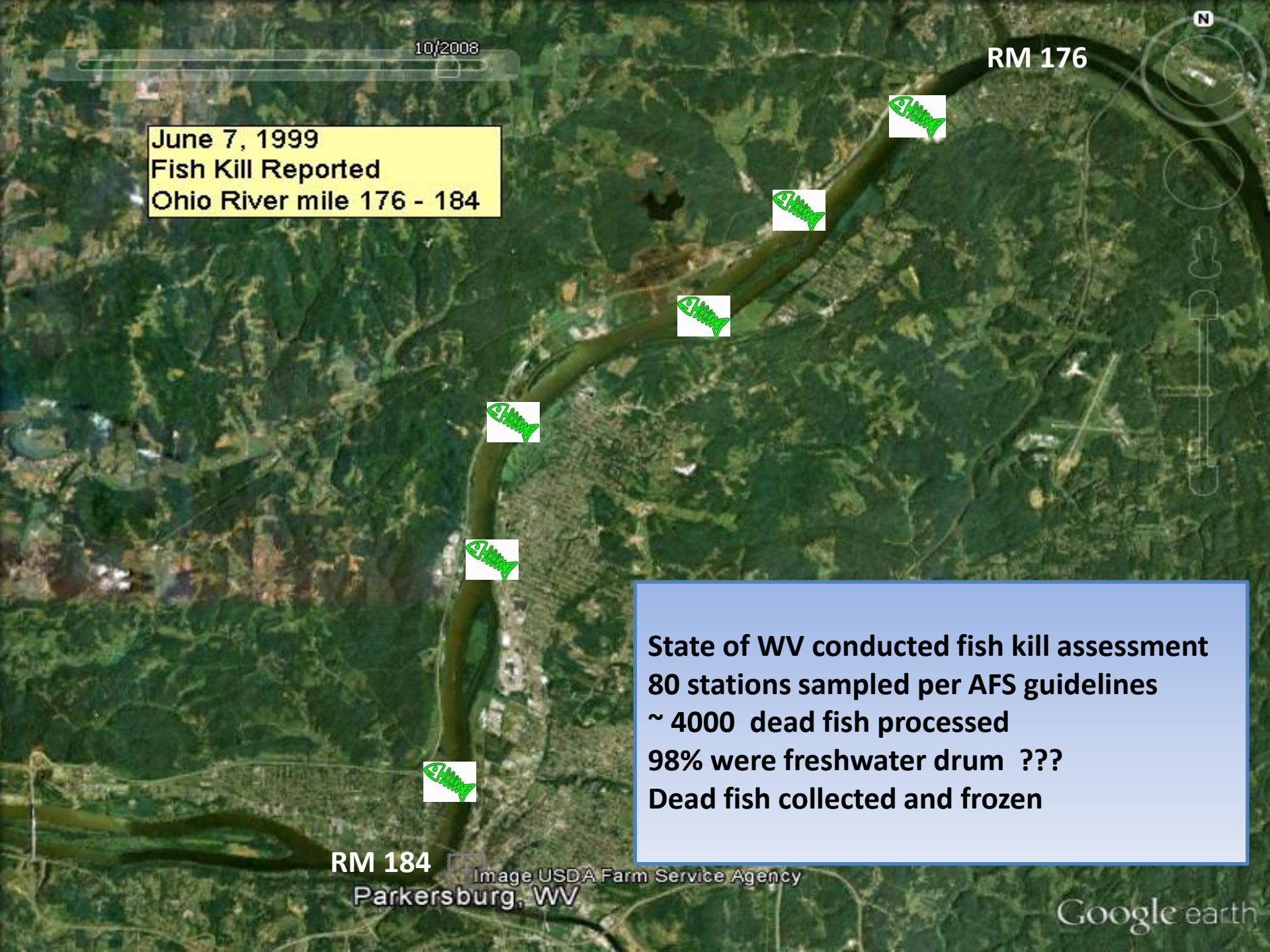

State of WV conducted fish kill assessment
80 stations sampled per AFS guidelines
~ 4000 dead fish processed
98% were freshwater drum ???
Dead fish collected and frozen

4/2008

Buckley Island
(refuge)

Muskingum Island
(refuge)

June 8 – 9, 1999 : checked some bed
Native mussels fine, siphoning and responsive
Zebra mussels abundant, responsive to touch

Site 11

Neal Island
(refuge)

Image

gle earth

September 2, 1999

- River experienced low flow conditions
- Occasional reports of dead fish continued into June and July, in the same general area
- Regular mussel surveys and investigations continued

October 1999

Fish kills continue.

Underwater videography, tracked dead zebras to the outfall of a chemical plating facility on the Ohio shoreline.

Regular mussel monitoring done at Muskingum Island refuge site in 1999 still showed native mussels and snails alive and zebras very abundant.

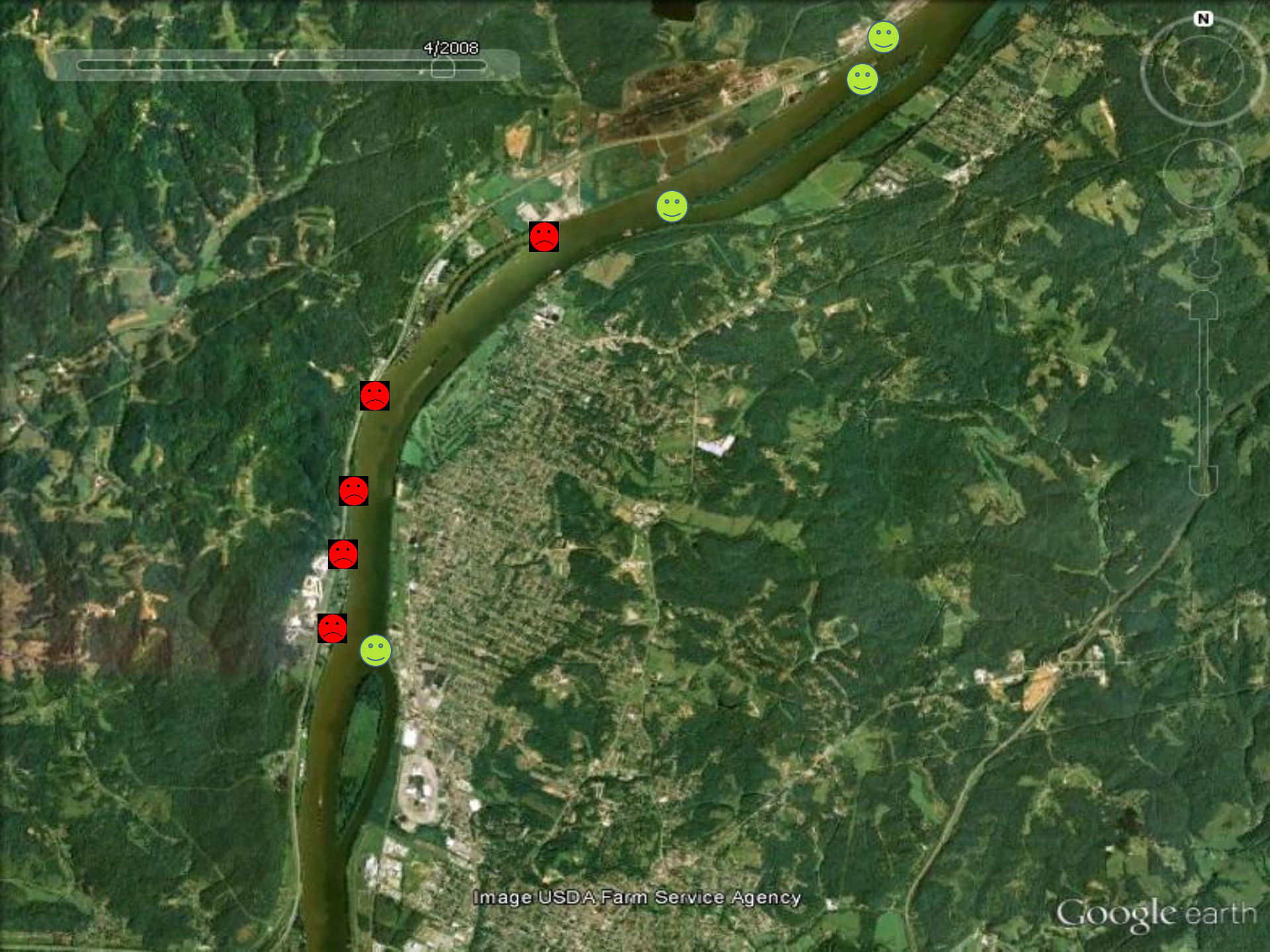
4/2008
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Image USDA Farm Service Agency
Google earth

Litigation filed in federal court under the Clean Water Act and CERCLA, U.S.A, States of WV and OH vs. Eramet Marietta and Elkem Metals.

Natural resource injuries claimed, under CERCLA, included:

- > 8600 fish (mostly freshwater drum)
- > 990,000 native freshwater mussels, 26 species, in five discrete beds (over 13 miles reach – incalculable losses in between)
- > 12,000,000 snails
- injuries to surface water and sediments
- other benthic invertebrates not listed above.

- Hazardous substances were primarily hexavalent chromium, with manganese and zinc, and the treatment chemical itself was harmful to aquatic life (sodium dimethyl-dithiocarbamate).

- Interferes with calcium metabolism of the mollusks (expressed in deformed zebra mussel shells)

- Ecological Specialist assessed Site 11 kill in 2000

- Surveyed 10m segments along transects
- 0.25m^2 quad at each 10m

- >990,000 native freshwater mussels,
- 26 species, in five discrete beds (over 13 miles reach – incalculable losses in between)

- Confirmed live mussels and zebra mussels upstream at Muskingum Island.

Site 11 est. 71.6/m^2 freshly dead snails

Total Kill > 12,000,000 snails

- How did we find the snail kill: by luck
  - Fish Kill lead to finding mussel kill
  - Quantitative assessment determined dead snails

- What is fresh dead?
  - Compare ratio of live to dead at Upstream Control
  - Dead shell is mobile - early detection important

Site 11, 2002 Pre-Restoration		
2 Unionid Species		0.40/m^2
Gastropods		0.0/m^2


• 2006


• 2006

May


8
7
6
5
4
2395 Apopka
Email: aes@
Since 1978

Site 11, 2007 Pre-Restoration		
7 Unionid Species		0.72/m^2
2 Gastropod Species		30/m^2

Pleurocera canaliculata
Birgella subglobosus

30-410
10
20
INCH

Site 11, 2007

2 species

30 snails/m^2

Site 11, 2012

4 species

3.36 snails/m^2

Pleurocera canaliculata

Lithasia verrucosa

Lithasia armigera

Birgella subglobosus

- 2012, 18 unionid species

- 2013 Neal Island

- 2014

Snail culture system at CZ/OSU

Lithasia

2008, 09, 13, 14

Lithasia armigera

- 2015: 765
- 2016: 181

Species 2017	Buckley	Muskingum	Site 11
Birgella subglobosus	(1)	(9)	9 (387)
Campeloma decisum		(2)	(12)
Lithasia verrucosa		32 (3)	6 (29)
Pleurocera canaliculata	445 (468)	135 (636)	49 (764)
Number Live (Dead) Species	1 (1)	2 (2)	3 (1)
Number Live Individuals	445	167	64
Density (snails/m^2)	14.83	3.29	1.91