UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

**MEMORANDUM**

PC Code: 123000
DPBarcode: D294305

**SUBJECT:** 2003 Monitoring Data for Isoxaflutole

**FROM:** William P. Eckel, Ph.D.
Environmental Risk Branch II
Environmental Fate and Effects Division (7507C)
William P. Eckel 10/20/03

**TO:** Joanne Miller
Don Stubbs
Registration Division (7505C)

**THRU:** Tom Bailey, Branch Chief
Environmental Risk Branch II / EFED (7507C)
Tom A. Bailey 10/22/03

**DATE:** October 20, 2003

This memorandum summarizes the important findings from isoxaflutole monitoring data collected in the spring and summer of 2003 by state agencies in Iowa, Illinois, Missouri, Nebraska, and Ohio. The DP barcodes covered are D294305, D294307, D294308, D294309, D294310, and D294311.

**Action Item**: Registration Division may wish to ask the registrant to sample existing wells, or install new monitoring wells, near reservoirs, lakes or ponds with relatively high concentrations (> 100 ppt) of DKN to determine if the surrounding ground water is being contaminated. See the section titled "*possible connection between contaminated reservoirs and contaminated ground water*," on page 3.

*Ohio*. The Ohio Department of Agriculture collected samples from 41 domestic wells, two creeks, a drainage ditch and a field tile. No isoxaflutole residues were detected.

*Illinois*. The Surface Water Section of Illinois EPA sampled 23 reservoirs. Twelve of these (52%) showed some contamination. This rate of contamination is similar to that seen in Missouri and Iowa. Three of these (13%) contained over 100 parts-per-trillion (ppt) of the 202248 active metabolite, also known as the diketonitrile or DKN.

*Missouri*. The Missouri Department of Natural Resources continued to sample drinking water reservoirs around the state. Drexel City Lake (Fig. 1), Cameron Lower #3 Reservoir (Fig. 2), and Grindstone Reservoir (Fig. 3) exceeded 100 ppt of DKN during summer, 2003. In Drexel City Lake, the concentration of metabolite 203328 increased through the winter of 2002, and DKN held steady, rather than dropping as they had in the past two winters.

Three Missouri reservoirs showed their first signs of contamination in the latest sampling, including Hamilton Reservoir in Caldwell County (9 ppt DKN), and Wyaconda Reservoir in Clark County (44 ppt DKN, 39 ppt 203328), and Spring Fork Lake in Pettis County (41 ppt DKN, 25 ppt 203328).

*Iowa*. Eight lakes and reservoirs were contaminated above 100 ppt DKN during summer 2003, including Rodgers Park Lake in Benton County (119 ppt), Don Williams Lake in Boone County (113 ppt), Avenue of the Saints Lake in Bremer County (197 ppt, see Fig. 4), West Lake (Osceola) in Clarke County (109 ppt, see Fig. 5), East Lake (Osceola) in Clarke County (282 ppt, see Fig. 6), Lower Pine Lake in Hardin County (148 ppt), Upper Pine Lake in Hardin County (145 ppt), and Red Haw Lake in Lucas County (132 ppt).

Sixteen other lakes were contaminated at greater concentrations in 2003 than in 2002, as shown in Table 1 below. While these comparisons are based on limited data (5 or 6 samplings in two years), they are consistent with the observation of increasing concentration over time, as seen in Drexel City Lake in Missouri.

*Nebraska*. Nebraska's program in 2003 included a number of reservoirs that were sampled for the first time, including Enders Reservoir, Merritt Reservoir, Box Butte Reservoir, Calamus Reservoir, Harlan County reservoir, Alexandria State Lakes, Cub Creek Reservoir, Branched Oak reservoir, Sherman Reservoir, and Carter P. Johnson lake. No isoxaflutole residues were detected in these lakes.

Nine lakes were contaminated, including Rockford Lake in Gage County (124 ppt DKN), Bruning Dam in Fillmore County (203 ppt), Cub Creek Recreation Area in Jefferson County (20 ppt and 4 ppt parent), Leisure Lake in Jefferson County (115 ppt), Bluestem Reservoir in Lancaster County (155 to 206 ppt), Conestoga Reservoir in Lancaster County (17 to 23 ppt), Wagon Train lake in Lancaster County (34 to 42 ppt), Pawnee Reservoir in Lancaster County (17 to 25 ppt), Swan Lake 5A in Saline County (12 to 41 ppt).

*Input to Reservoir by Stream Flow Demonstrated*. Bluestem Reservoir and its North and West Inflows were monitored weekly from early May to mid-July. The increase in DKN concentration in the reservoir from about 150 ppt to 200 ppt (Fig. 7) corresponds in time (late May) to peaks of DKN concentration in the North and West Inflows (Figs. 8 and 9) of 500 to 800 ppt, including parent isoxaflutole. These data demonstrate the input of isoxaflutole residues to a reservoir via stream flow.

*Possible Connection Between Contaminated Reservoir and Contaminated Ground Water.* The concentration of DKN in Bruning Dam reached a high of 203 ppt (plus 9 ppt parent isoxaflutole) in late May 2003 (Fig. 10). At the same time, monitoring wells 5, 7 and 9 below the dam registered 11 to 16 ppt DKN. The wells are 33, 22, and 72 feet deep, respectively. These data suggest that contaminated water in the reservoir may be the source of the ground water contamination. "Induced infiltration," or the transport of contaminated water from a surface water body through sediments or a river bank to a well under pumping, has already been used to explain the presence of DKN in water intake galleries along the Platte River in Lincoln, Nebraska.

If other reservoirs, lakes or ponds with relatively high levels of DKN also communicate with the surrounding ground water, it is possible that they too will be sources of ground water contamination. This could pose a danger to nearby domestic wells and small community water systems.

Table 1: Comparison of 2002 and 2003 DKN Concentrations in 16 Iowa Lakes

| **Lake or Reservoir** | **2002 max/min [DKN]** | **2003 max/min [DKN]** |
|---|---|---|
| Badger Creek Lake | 25 / 20 | 96 / 88 |
| Lake Hendricks | 32 / 28 | 95 / 87 |
| Beaver Lake | 34 / 33 | 52 / 42 |
| Lake Anita | 10 / 8 | 23 / 23 |
| Swan Lake | 17 / 10 | 33 / 26 |
| Rodgers Park Lake | 8 / 5 | 119 / -- |
| Lower Pine Lake | 13 / 11 | 148 / 55 |
| Upper Pine Lake | 15 / 13 | 145 / 42 |
| Red Rock Lake | 35 / 17 | 58 / 24 |
| Big Creek Lake | 10 / 9 | 39 / 26 |
| Saylorville Lake | 14 / 7 | 28 / 7 |
| Hickory Grove Lake | 22 / 14 | 63 / 34 |
| Casey (Hickory Hills) Lake | 9 / 4 | 70 / 61 |
| Don Williams Lake | 81 / 32 | 113 / 24 |
| Beeds Lake | 6 / 0 | 19 / 4 |
| Briggs Woods Lake | 18 / 8 | 24 / 12 |

**Figure 1: Drexel City Lake**
**2 = DKN, 3 = 203328**

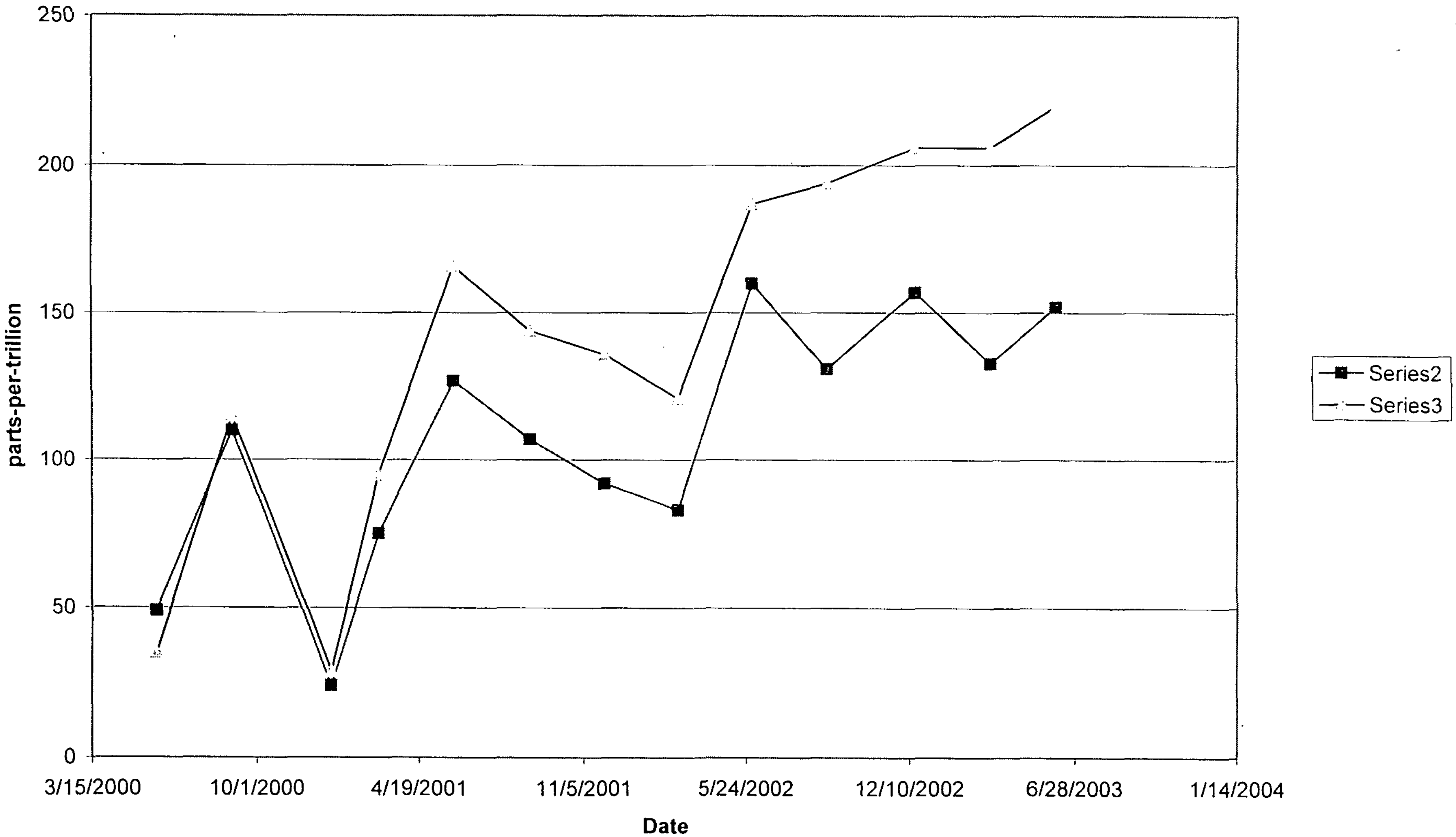


**Figure 2: Cameron Lower #3 Reservoir**
**2 = DKN, 3 = 203328**

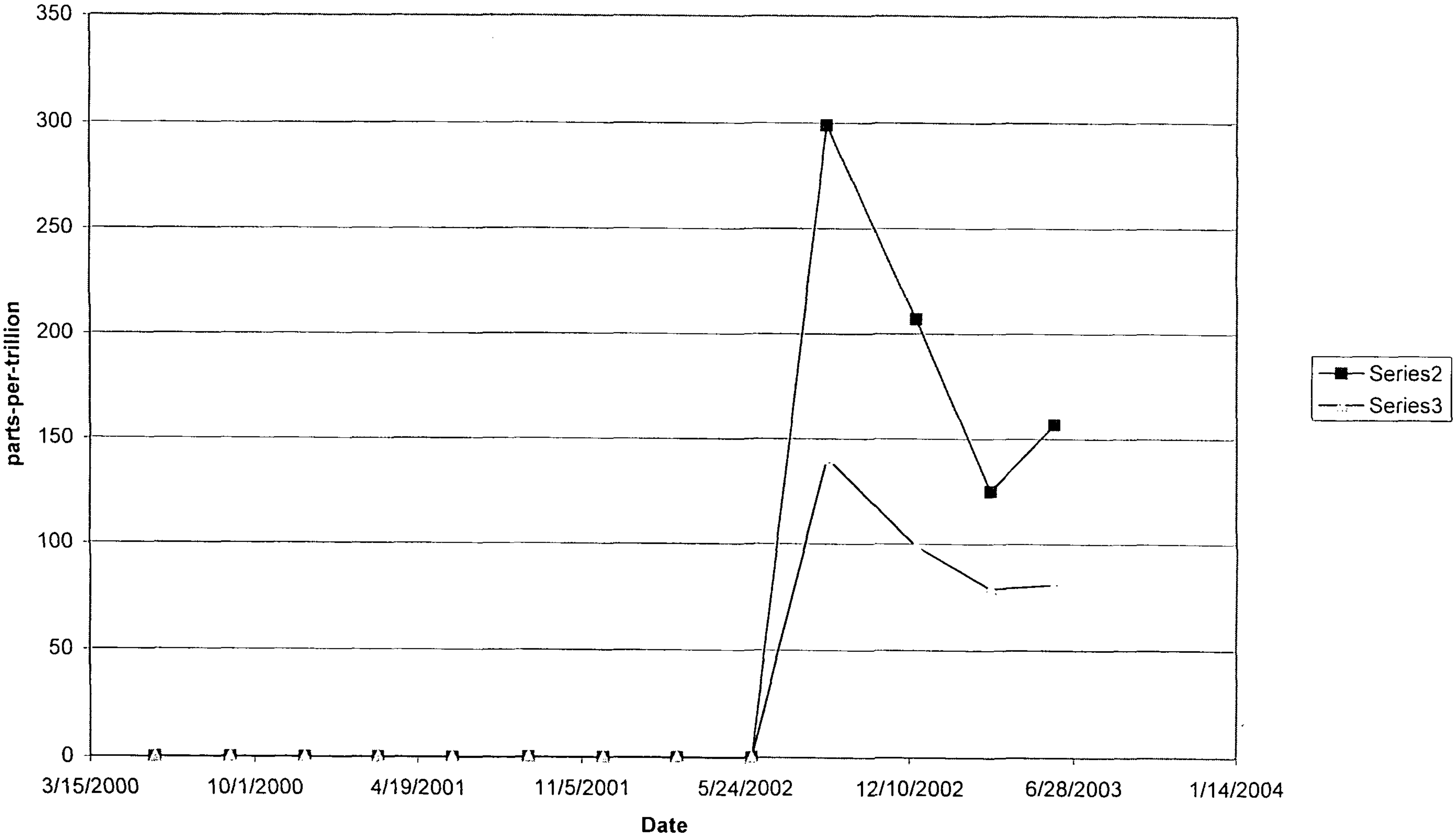


**Figure 3: Grindstone Reservoir**
**2 = DKN, 3 = 203328**

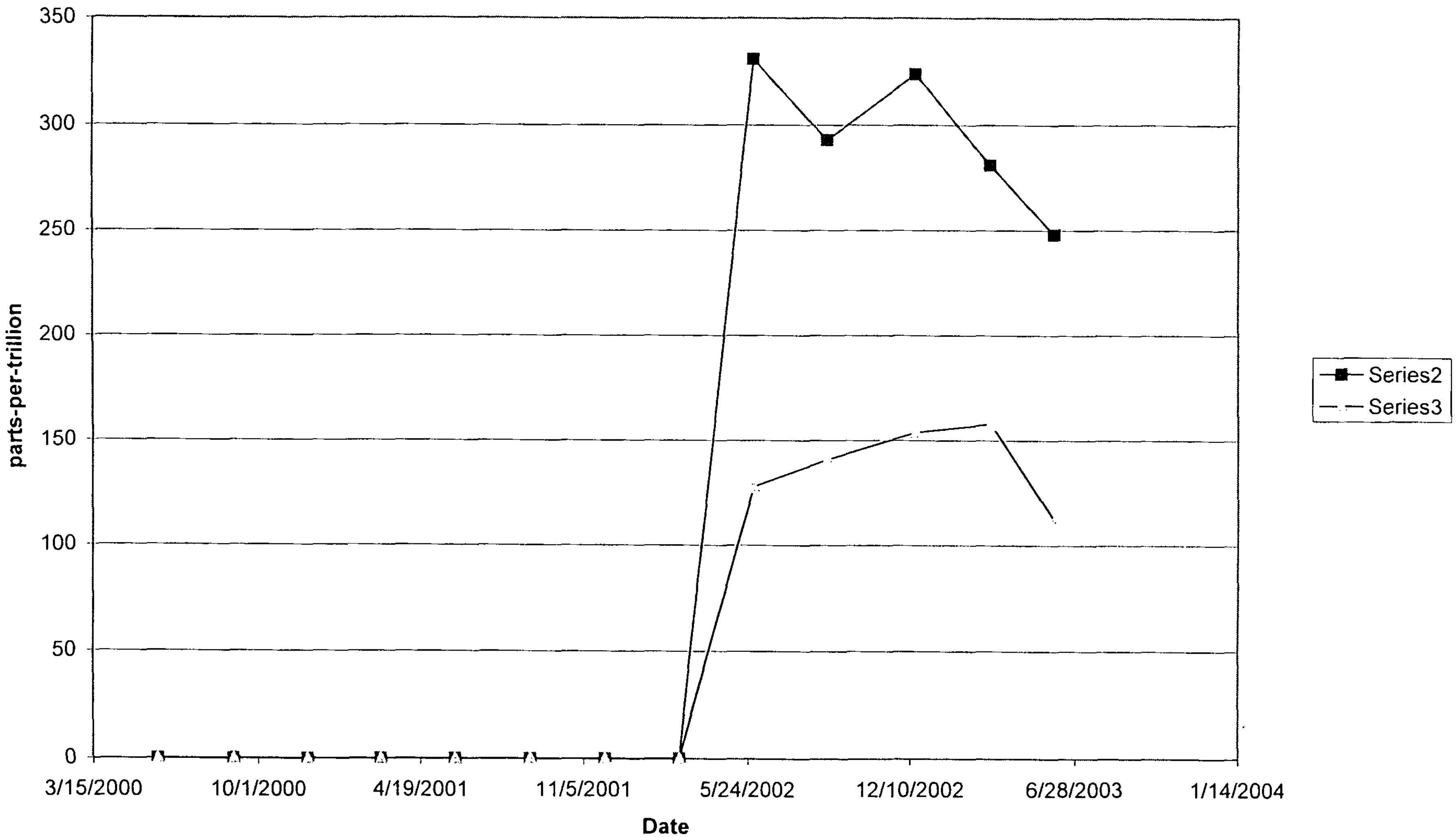


Figure 4: Avenue of the Saints Lake IA
2 = DKN, 3 = 203328

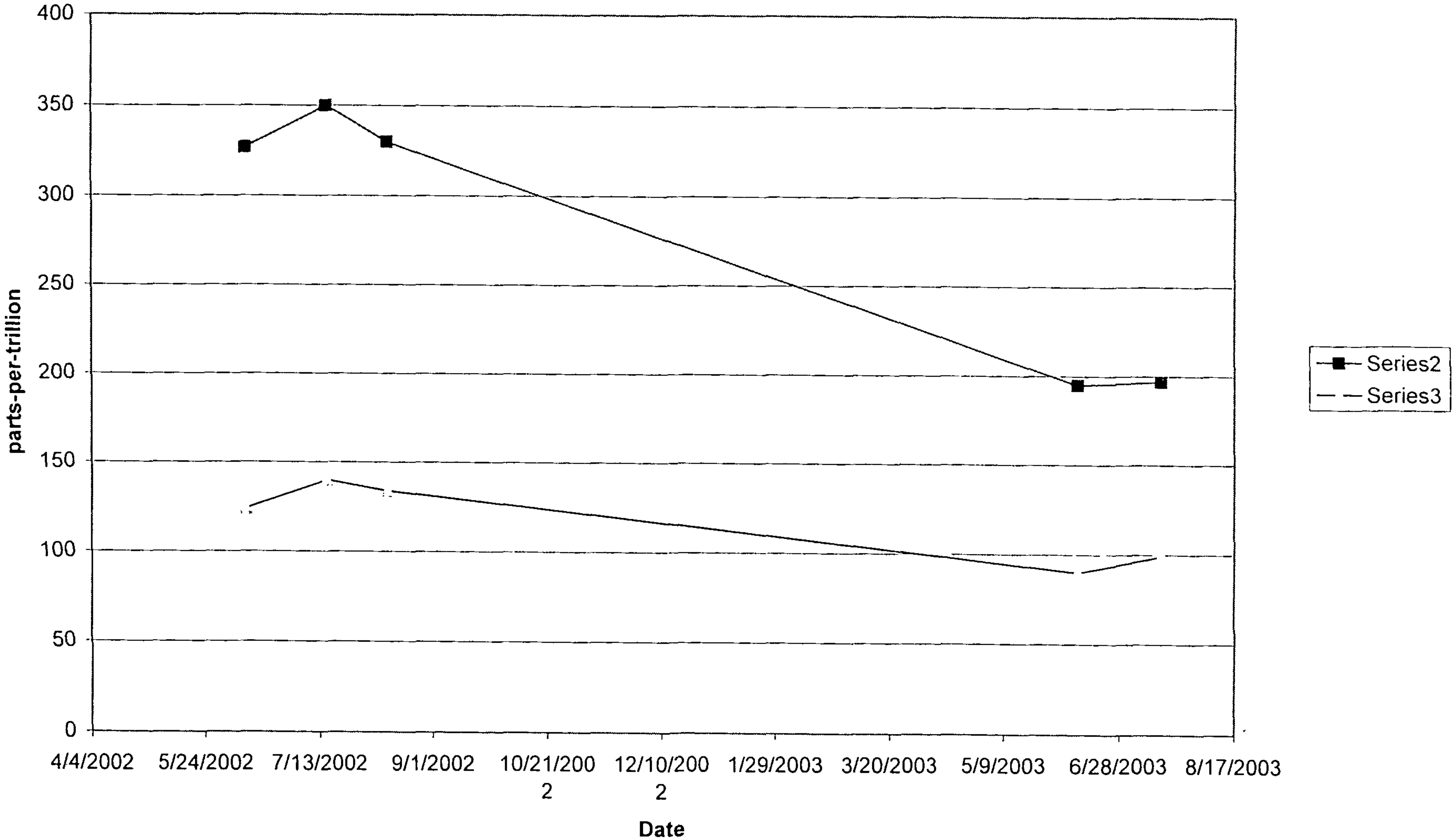


Figure 5: West Lake Osceola
2= DKN 3 = 203328

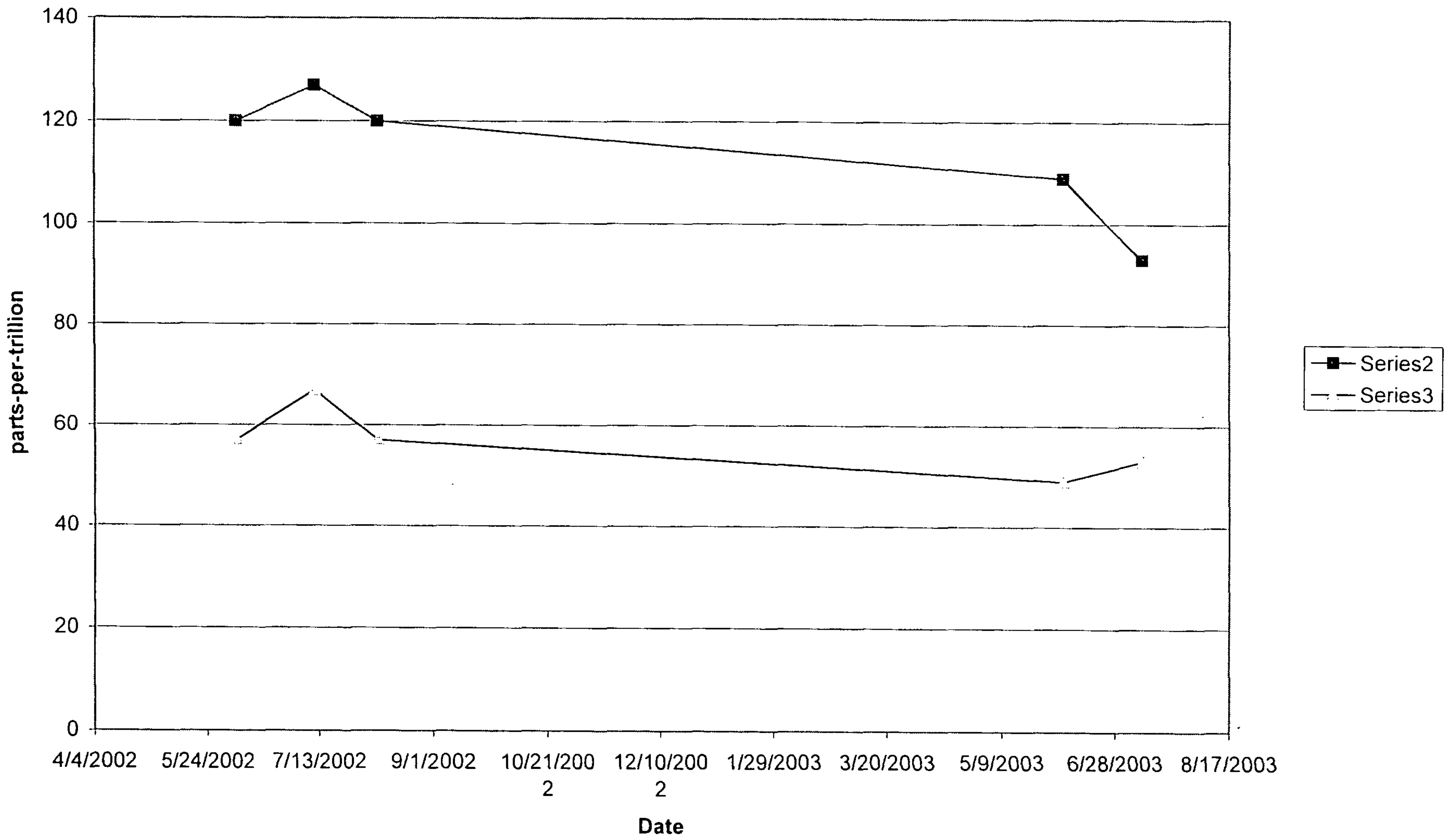


**Figure 6: East Lake Osceola**
**2 = DKN 3 = 203328**

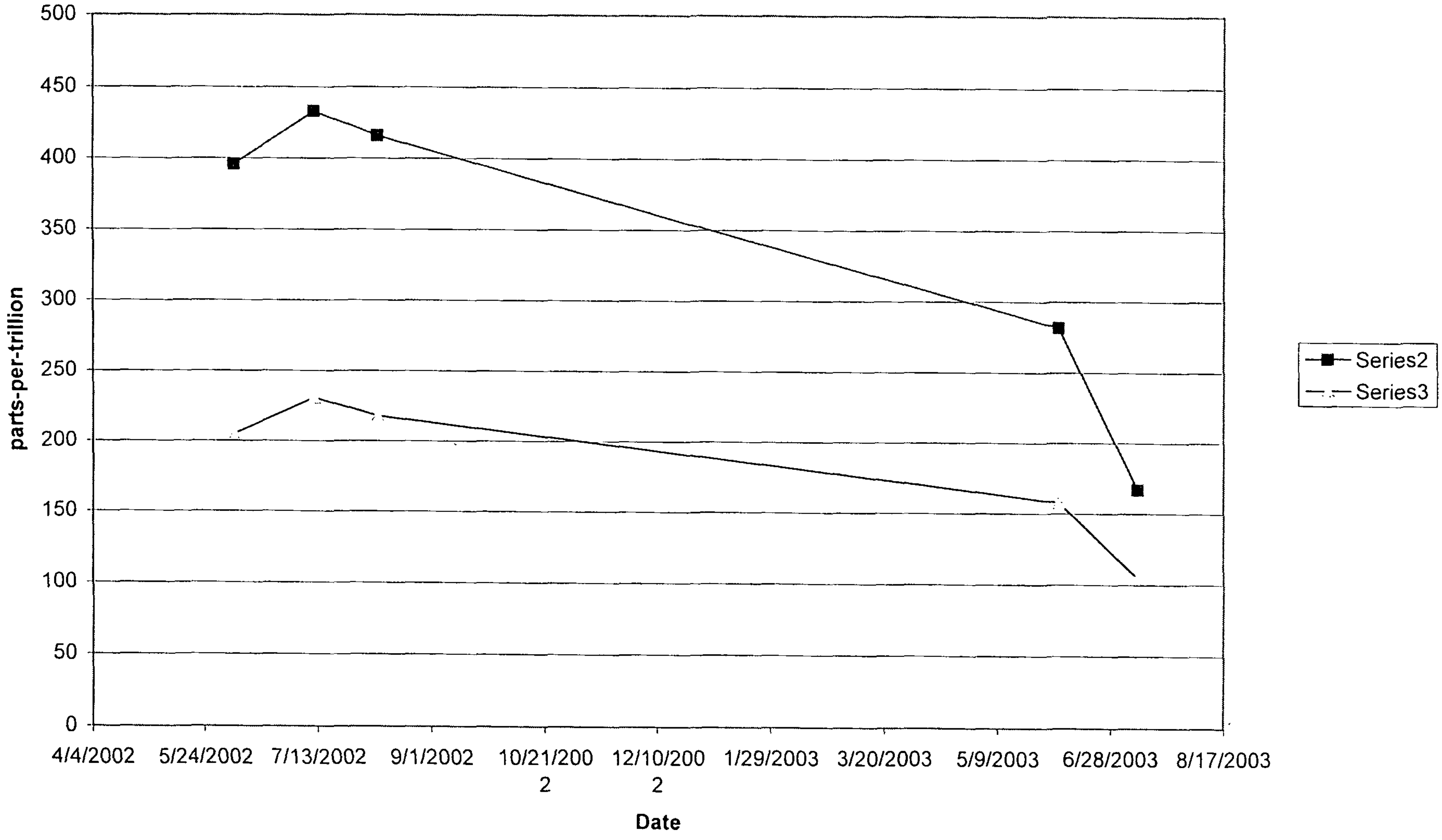


**Figure 7: Bluestem Reservoir NE**
**2 = DKN, 3 = 203328**

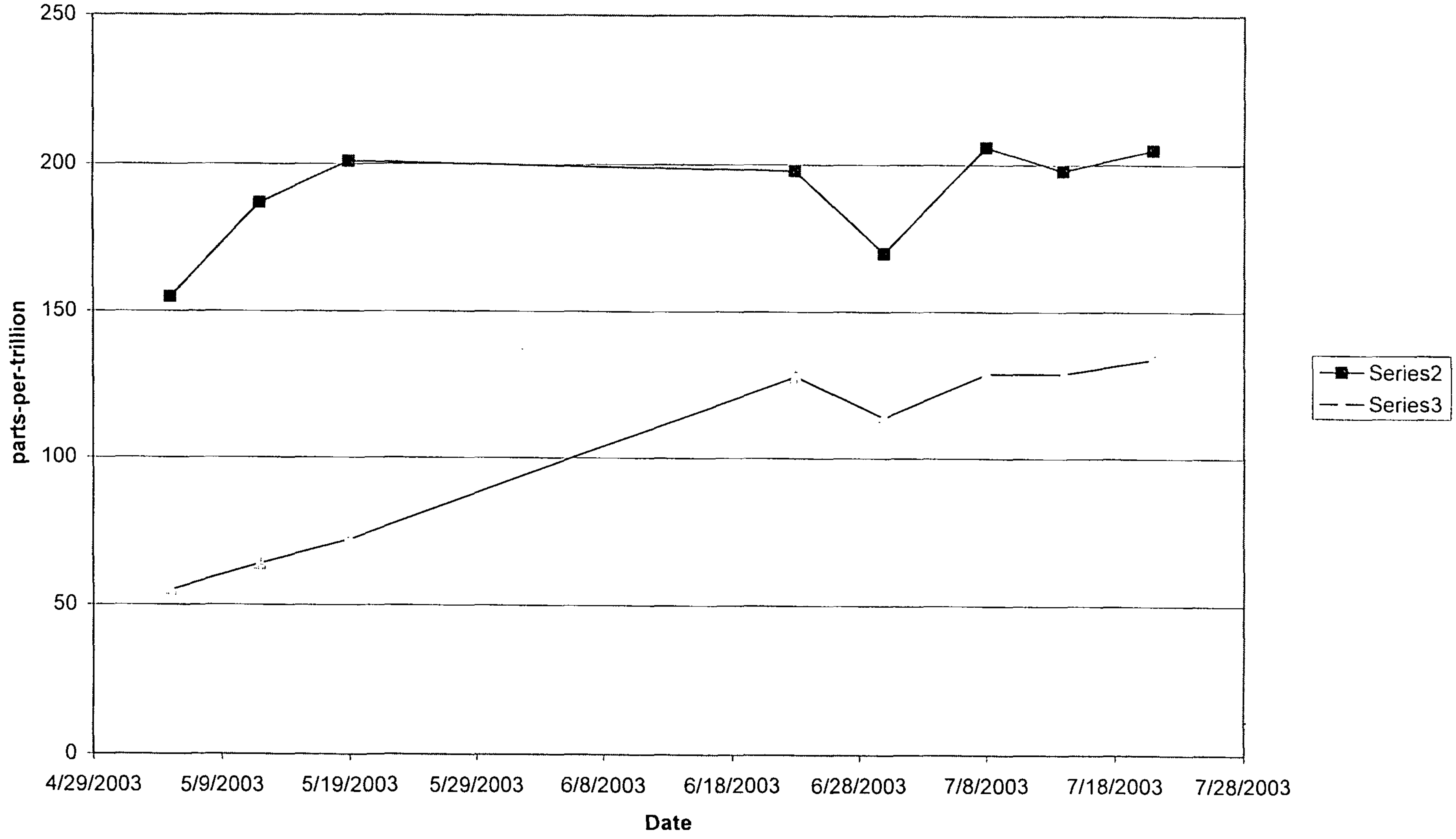


**Figure 8: Bluestem Reservoir North Inflow**
**1= parent, 2 = DKN, 3 = 203328**

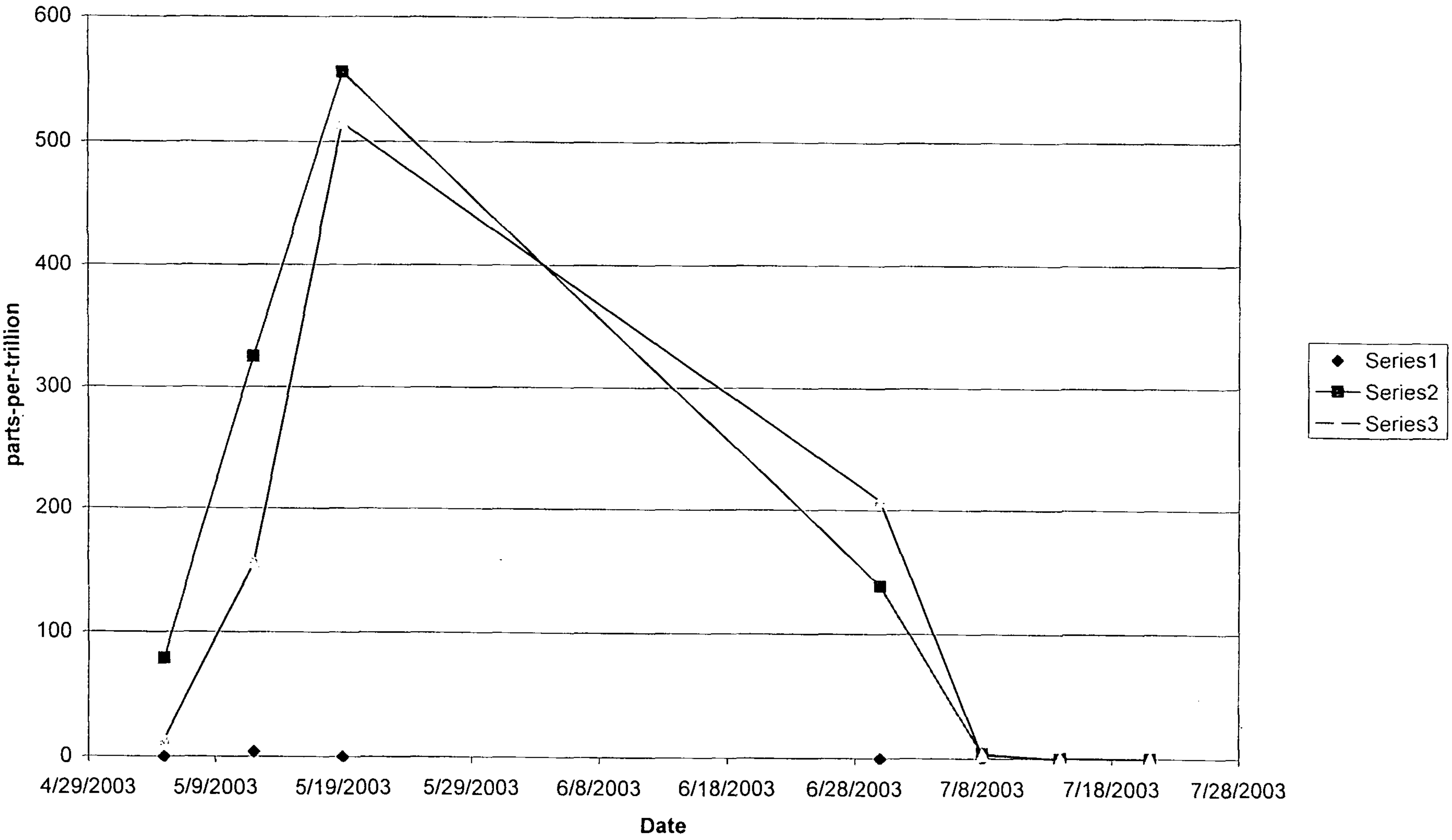
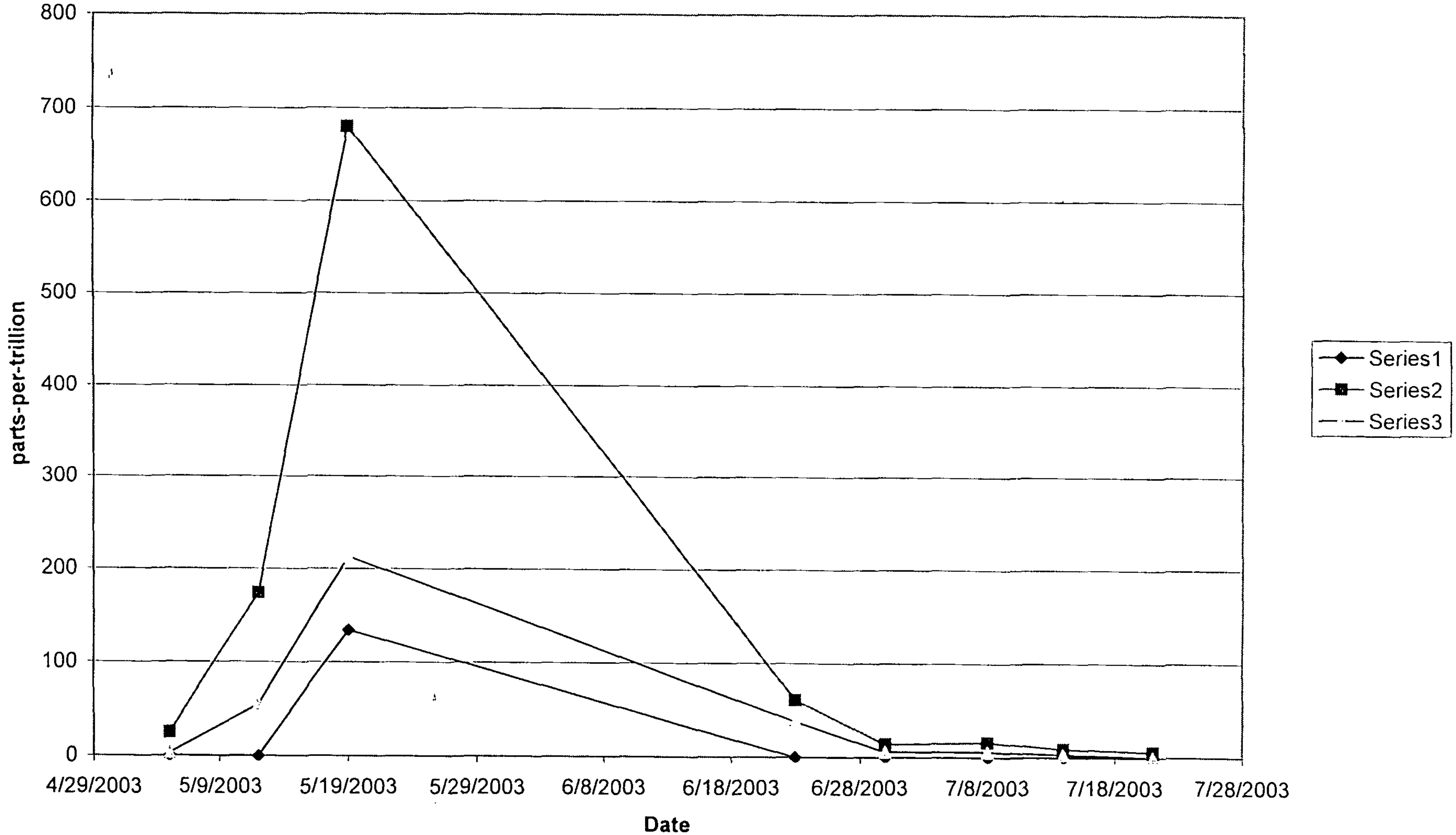


Figure 9: Bluestem Reservoir West Inflow
1 = parent, 2 = DKN, 3 = 203328



## Figure 10: Bruning Dam NE
## 2 = DKN, 3 = 203328