

Investigating Hydroelectric Power Dams with My World GIS Teacher Guide

Hydropower is energy that comes from the force of moving water. Most hydroelectric power plants are developed at dams. In this activity, students will use My World GIS to study and analyze hydroelectric power dams. They will

1. Query and analyze features of US hydroelectric power dams.
2. Query and analyze features of the 10 most powerful US hydroelectric power dams.
3. Create a new layer containing Pennsylvania hydroelectric power dams.
4. Query and analyze features of Pennsylvania hydroelectric power dams.

Model the following procedural instructions with your students. It is recommended that you display your computer image at the front of the classroom.



Step 1: Download data.

- a. Open your Web browser. Go to www.ei.lehigh.edu/learners/energy/
- b. Click on **Investigating Hydroelectric Power Dams with My World GIS**.

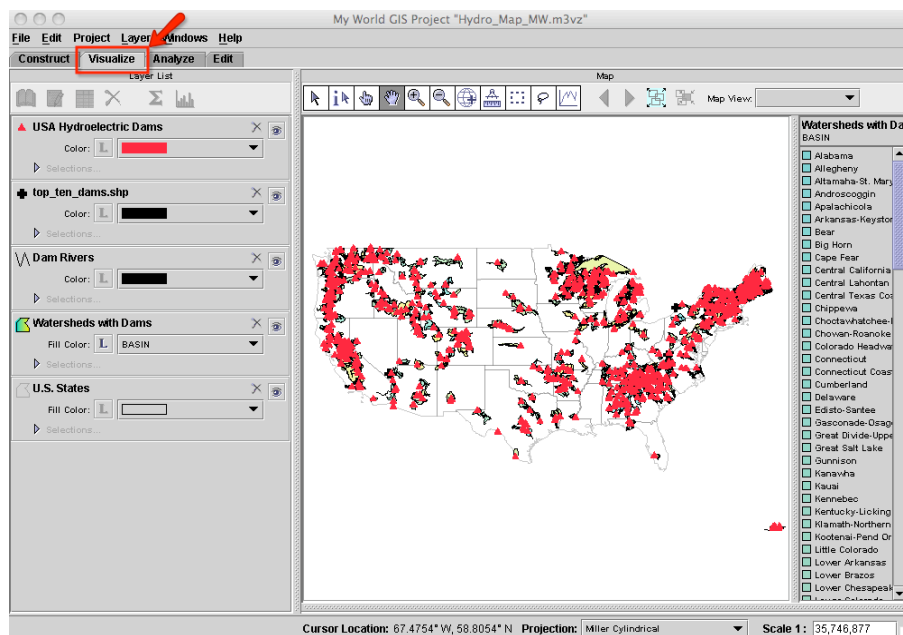
This downloads the **Hydro_Map_MW.m3vz** file on to your desktop (see icon below).



Step 2: Load data in My World GIS.

- a. **Double click** on the **Hydro_Map_MW.m3vz** icon to open the file in My World GIS.

The window below should open on your computer. Check to make sure you are in the **visualize** mode (see arrow below).





Step 3: Query and analyze US hydroelectric dams. (Questions 1 - 5)

- Click on the first layer **USA Hydroelectric Dams** in the **Layer List**.
- Click on the **table** icon on the **Layer List tool bar** (see arrow below). A data table for the **USA Hydroelectric Dams** layer will open.

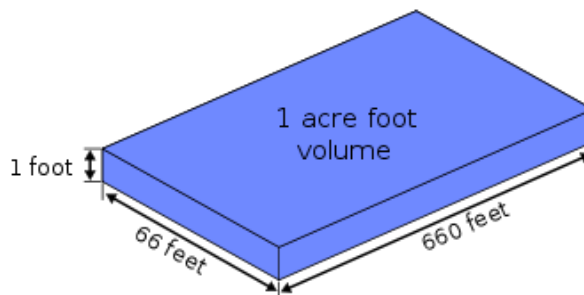
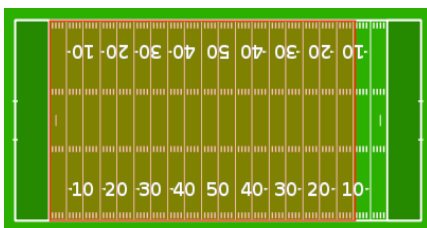


This data table contains 1,184 records (see arrow below).

DAM NAME	WATERSHED	RIVER	STATE	YEAR COMPLETED	HEIGHT ft	RESERVOIR acre feet	LONGITUDE	LATITUDE
1 MISSION	Hiwassee	HIWASSEE R	NC	1924	50	1	-83.9333	35.0667
2 OLD RIVER	Lower Red	OLD RIVER, MISSISSIPPI RIVER	LA	1990	128	1	-91.6167	31.0833
3 UPPER EOLYPTNA	Upper Kana Peninsula	EKLUTNA RIVER	AK	1923	60	15	-149.326	60.35
4 BEAVER CREEK DIVERSION	Upper Stanislaus	BEAVER CREEK	CA	1990	54	20	-120.2766	39.2344
5 ALICE FALLS	Ausable	AUSAIBLE RIVER	NY	1895	50	24	-73.4647	44.5189
6 UPPER SALMON FALLS A-PLANT & FOREBAY	Upper Snake-Rock	SHAKE RIVER	ID	1937	85	26	-114.9239	42.7725
7 IRON FALLS	English-Salmon	CHATEAUGAY RIVER	MT	1956	63	24	-74.098	44.8135
8 IVY RIVER	Upper French Broad	IVY R, FRENCH BROAD R	NC	1919	63	40	-82.6	35.7667
9 CRYWELDE	Big Thompson	BIG THOMPSON RIVER	CO	1979	57	43	-105.3117	40.45
10 BRADFORD	Waits	WAITS RIVER	VT	1905	50	54	-72.1293	43.9917
11 MURPHY'S FOREBAY SOUTH	Upper Stanislaus	ANGELS CREEK	CA	1953	67	67	-120.433	38.1488
12 IVY	Interior Puerto Rico	IVY	PR	1950	95	71	-66.8766	18.233
13 CHATEAUGAY CHASM	English-Salmon	CHATEAUGAY RIVER	NY	1954	83	73	-74.1124	44.9317
14 UPPER SALMON FALLS B-PLANT FOREBAY	Upper Snake-Rock	SHAKE RIVER	ID	1947	70	60	-114.9075	42.7717
15 CHICAGO PARK FOREBAY	Upper Bear	BEAR RIVER	CA	1965	60	97	-120.8932	38.1568
16 SUPERIOR FALLS	Bas-Montreal	MONTREAL	WI	1966	138	100	-90.4149	46.5587
17 BOX CANYON	Pend Oreille	PEND OREILLE	WA	1955	105	100	-117.4267	48.7967
18 BOX CANYON FOREBAY DAM	Pend Oreille	PEND OREILLE	WA	1955	32	108	-117.4267	48.7969
19 ROZA DIVERSION	Upper Yakima	YAKIMA RIVER	WA	1939	67	100	-120.465	46.7467
20 BEAR CREEK DIVERSION	Upper San Joaquin	BEAR CREEK	CA	1927	55	103	-119.9884	37.3306
21 PELLEJAS	Interior Puerto Rico	PELLEJAS	PR	1950	50	108	-56.7066	18.2116
22 MINNEWAPWA	Middle Connecticut	MINNEWAPWA BROOK	NH	1923	63	120	-72.16	42.9167
23 RED NO. 1	Lower Willamette	BULL RUN RIVER - OS	OR	1911	55	150	-122.6	45.6125
24 HARRIET LAKE	Clackamas	OAK GROVE	OR	1923	68	152	-121.97	45.075
25 TRENTON - MAIN DAM	Mohawk	WEST CANADA CREEK	NY	1901	60	155	-75.1531	42.2853
26 WEBSTER LAKE	Upper Chattahoochee	WHITE CR, CHATTAHOOCHEE R	GA	1955	105	171	-83.7167	34.6187
27 MIDDLESEX NO. 2	Winooski	WINOOSKI RIVER	VT	1929	51	180	-72.6824	44.2923
28 CASCADE	Upper Androscooggin	ANDROSCOGGIN RIVER	NH	1903	57	200	-71.1972	44.449
29 TIGER CREEK REGULATOR	Upper Mokelumne	TIGER CREEK	CA	1931	96	234	-120.5	38.4167
30 HUNTERS	Upper Stanislaus	MILL CREEK	CA	1927	58	238	-120.3992	38.1385
31 HALLEY FOREBAY NO. 2	Upper Bear	BEAR RIVER	CA	1913	55	250	-121.1	38.0167
32 NORTH FORK DIVERSION DAM	Upper Rouge	N F R ROUGE (ROFFSTREAM)	OR	1929	50	250	-122.515	42.7583
33 SAVON	Bas-Montreal	MONTREAL	WI	1939	133	250	-90.3742	46.5392
34 WOLCOTT	Lamoille	LAMOILLE RIVER	VT	1920	52	258	-72.4431	44.5373
35 KEENE CREEK	Upper Klamath	KEENE CREEK	OR	1959	78	260	-122.47	42.13
36 KENT FALLS	Great Onondaga	SARANAC RIVER	NY	1901	56	265	-73.8953	44.7018
37 PRIETO	Cuabinnas-Osanalbo	PRIETO	PR	1955	98	285	-56.8552	18.1833
38 FOUR HOUSE	Upper Yuba	MIDDLE YUBA RIVER	CA	1969	97	290	-120.9988	39.4122
39 N F FORK REG. DAM	Upper Rouge	N F FORK ROUGE RIVER	OR	1955	50	299	-122.48	42.8167
40 STANISLAUS FOREBAY EAST	Upper Cateminas	NORTH FORK STANISLAUS RIVER-OS	CA	1909	55	320	-120.5	38.1667
41 WHEELER'S CANAL, MI 67.1	Middle Platte-Butte	TRIO-COUNTY CANAL OFF PLATTE R	NE	1941	55	323	-99.8023	40.6983
42 URUM AFTERBAY	Upper Bear	BEAR RIVER	CA	1968	104	330	-120.7667	39.25
43 KEENE CREEK DIVERSION	Upper Klamath	KEENE CREEK	OR	1959	78	339	-122.48	42.1289
44 DEERFIELD NO. 2	Deerfield	DEERFIELD RIVER	MA	1913	76	350	-72.7067	42.5233
45 BOLTON FALLS	Winooski	WINOOSKI RIVER	VT	1899	75	355	-72.8167	44.35
46 WILBOR	Watauga, North Carolin	WATAUGA RIVER	TN	1912	77	388	-82.123	36.343
47 WOKONOCO MILLS 60 FT DAM (FERC)	Wetland	WESTFIELD RIVER	MA	1950	60	393	-72.8288	42.1568
48 MID SHEL CANAL MI 15.8	Middle Platte-Butte	TARDET CANYON COULEE	NE	1941	50	395	-100.4843	40.8956
49 HARRISON RIDGE	Upper Juniata	JUNIATA RIVER	PA	1908	51	400	-78.0317	40.54
50 SEARSBURG	Deerfield	DEERFIELD RIVER	VT	1922	50	412	-72.9333	42.8667
51 SODA SPRINGS	North Umpqua	N UMPQUA R	OR	1952	126	412	-122.5117	43.3017
52 NANAKA	Upper Roanoke	ROANOKE	VA	1906	60	425	-78.9756	37.2544
53 FLATIRON	Big Thompson	CHIMNEY HOLLOW CREEK	CO	1952	86	436	-105.2233	40.3683
54 CEDAR HILL DAM	Housatonic	HOUSATONIC RIVER	CT	1909	445	445	-73.4872	41.8667
55 FROD LAKE DAM A	Clackamas	CLACKAMAS	OR	1955	50	460	-122.0466	45.56
56 FROD LAKE DAM B	Clackamas	CLACKAMAS	OR	1955	70	460	-122.0684	45.1217
57 ADUNTAS	Interior Puerto Rico	RIO GRANDE DE ARECIBO	PR	1950	80	465	-66.7216	18.2016
58 YAHUECAS	Cuabinnas-Osanalbo	RIO BLANCO	PR	1956	90	470	-56.816	18.2193
59 CENTRAL MIDWAY	Middle Platte-Butte	SUPPLY CANAL	NE	1941	60	500	-100.05	40.79
60 SCHNEEBELE	Middle Platte-Butte	SUPPLY CANAL	NE	1941	58	518	-100.04	40.77

The information on the data table includes the location of the dam, the height of the dam (in feet), and the area of the reservoir behind the dam. The area behind the dam is measured in units of acre feet. One acre is about the **area** size of a football field. The figure on the left shows the area of one acre overlaid on an American football field.

One acre foot is about the **volume** size of a football field that is one foot deep. The figure on the right shows the volume of one acre foot. It is a volume that would hold 325,851 gallons of water.



- c. Click on the **YEAR COMPLETED** column **once**. What happens to the column? You should notice that the column title box is highlighted in white and the years are sorted in **ascending** order. The dam completed at the earliest date is at the top of the list.

Scroll down the table to row 1147. Note that this dam and the 37 records below it do not have a year listed. The completion date of these dams are not in the data table.

- d. Click on the **YEAR COMPLETED** column a **second** time. What happens to the column? You should notice that the years are sorted in **descending** order. The dam most recently completed is at the top of the list.

- e. Click on the **YEAR COMPLETED** column a **third** time. What happens to the column? You should notice that the column title box is grey like the others in the table and the years are neither in ascending nor descending order. The years go back to their original order.



Instruct students to use the USA Hydroelectric Dams data table to answer **questions 1 - 5** on their investigation sheet.

- f. Close the data table for the **USA Hydroelectric Dams** (see arrow below).

DAM NAME	WATERBOD	RIVER	STATE	YEAR COMPLETED	HEIGHT	RESERVOIR acre feet	LONGITUDE	LATITUDE
1. MCGONN	Hewessee	HONASSEE R	NC	1924	50	1	-83.8333	35.0667
2. OLD RIVER	Lower Red	OLD RIVER, MISSISSIPPI RIVER	LA	1990	128	1	-91.8167	31.0833
3. LOWER EKOLONA	Upper Kenna Pastozula	EKOLONA RIVER	AK	1923	80	18	-148.225	60.35
4. BEAVER CREEK DIVERSION	Upper Stanislaus	BEAVER CREEK	CA	1889	54	20	-120.2768	38.2344
5. ALICE FALLS	Ausable	AUSAIBLE RIVER	NY	1895	50	24	-73.4647	44.5189
6. UPPER SALMON FALLS A-PLANT & FOREBAY	Upper Snake-Rook	SNAKE RIVER	ID	1937	85	26	-114.8238	42.725
7. HIGH FALLS	English-Salmon	CHATEAUGAY RIVER	NY	1906	83	34	-74.986	44.9135
8. VVI RIVER	Upper French Broad	VVI R. FRENCH BROAD R	NC	1818	83	40	-82.8	35.9667
9. WILWILDE	Big Thompson	BIG THOMPSON RIVER	CO	1979	97	43	-105.3117	40.43
10. BRADFORD	Waits	WAITS RIVER	VT	1865	50	54	-72.1283	43.9977
11. WARDEN'S FOREBAY SOUTH	Upper Stanislaus	ANDREWS CREEK	CA	1953	87	97	-120.8433	38.1488
12. VVI	Inferior Puato Rico	VVI	PR	1950	85	71	-66.6766	18.233
13. CHATEAUGAY CHASM	English-Salmon	CHATEAUGAY RIVER	NY	1664	83	73	-74.124	44.9377
14. UPPER SALMON FALLS B-PLANT FOREBAY	Upper Snake-Rook	SNAKE RIVER	ID	1947	70	60	-114.9075	42.7717
15. CHICAGO PARK FOREBAY	Upper Bear	BEAR RIVER	CA	1966	80	97	-120.8933	38.1808
16. SAFFERSON FALLS	Bad Montreal	MONTREAL	WI	1798	100		-88.4149	46.5997
17. BOX CANYON	Pend Oreille	PEND OREILLE	WA	1965	105	100	-117.4267	48.7967
18. BOV CANYON FOREBAY DAM	Pend Oreille	PEND OREILLE	WA	1965	102	100	-117.4267	48.7969
19. ROZA DIVERSION	Upper Yampa	YAKIMA RIVER	WA	1938	87	100	-120.465	46.7467
20. BEAR CREEK DIVERSION	Upper San Joaquin	BEAR CREEK	CA	1947	85	103	-118.8848	37.2068
21. BELLEFLEUR	Inferior Puato Rico	PELLELAG	PR	1950	50	108	-68.7966	18.2116
22. MINNEWAWA	Middle Connecticut	MINNEWAWA BROOK	NH	1923	83	120	-72.18	42.9167
23. PER NO. 5	Lower Willamette	WILLAMETTE RIVER - OR	OR	1911	85	150	-123.8	45.975
24. HARRIET LAKE	Clackamas	OAK GROVE	OR	1923	88	152	-121.97	45.975
25. TRENTON - HARK DAM	Mitawk	WEST CANADA CREEK	NT	1861	80	155	-75.1531	42.3853
26. WEBSTER LAKE	Upper Chatahoochee	WHITE CR. CHATAHOOCHEE R	GA	1855	105	171	-83.7167	34.8167
27. MIDDLEBURY NO. 2	Winooski	WINOOSKI RIVER	VT	1928	51	180	-72.6824	44.2923
28. CASCAD	Upper Andersonoggin	ANDERSONOGGIN RIVER	NH	1863	57	200	-71.1932	44.446
29. TIGER CREEK REGULATOR	Upper Mokelumne	TIGER CREEK	CA	1931	86	234	-120.5	38.4167
30. HUNTERS	Upper Stanislaus	MILL CREEK	CA	1937	58	238	-120.3992	38.1665
31. HALSEY FOREBAY NO. 2	Upper Bear	DRY CREEK	CA	1913	55	250	-121.1	38.6167
32. NORTH FORK DIVERSION DAM	Upper Rouge	N. F. ROUGE (ROFFSTREAM)	OR	1928	50	250	-122.916	42.7883
33. SAVON	Bad Montreal	MONTREAL	WI	1793	100		-88.2742	46.5992
34. WOLCOTT	Lamoille	LAMOILLE RIVER	VT	1920	52	258	-72.4437	44.5373
35. KEENE CREEK	Upper Hsanhth	KEENE CREEK	OR	1898	78	260	-122.47	42.13
36. XENT FALLS	Great Chazy-Saranac	SARANAC RIVER	NY	1891	58	265	-73.6853	44.7019
37. PHIBO	Culebrinas-Ouanalibo	PHIBO	PR	1965	86	265	-68.8553	18.1833
38. OUR HOUSE	Upper Yuba	MIDDLE YUBA RIVER	CA	1869	87	280	-120.9958	39.4122
39. N. FORK REG. DAM	Upper Rouge	N. FORK ROUGE RIVER	OR	1965	50	309	-122.49	42.8167
40. STANISLAUS FOREBAY EAST	Upper Yuba	NORTH FORK STANISLAUS RIVER-OB	CA	1928	55	320	-120.15	39.244
41. W. PHILLIPS CANAL MI 87.1	Middle Platte-Buttala	TRI-COUNTY CANAL OFF PLATTER	NE	1841	55	323	-99.8023	40.8883
42. CROM AFTERBAY	Upper Bear	BEAR RIVER	CA	1868	104	328	-120.7667	39.244
43. KEENE CREEK DIVERSION	Upper Hsanhth	KEENE CREEK	OR	1899	78	338	-122.48	42.1389
44. DEERFIELD NO. 2	Deerfield	DEERFIELD RIVER	MA	1913	76	350	-72.7067	42.6733
45. BOLTON FALLS	Winooski	WINOOSKI RIVER	VT	1889	75	355	-73.8167	44.36
46. WILBUR	Watauga, North Carolina	WATAUGA RIVER	TN	1912	77	388	-82.123	36.343
47. WINDWOOD MILLS 88 FT DAM (FERC)	Deerfield	DEERFIELD RIVER	MA	1960	80	392	-72.8288	42.1668
48. MID-SHELL CANAL MI 15.8	Middle Platte-Buttala	TARGET CANYON COULEE	NE	1841	50	395	-108.4843	40.9558
49. WARRIOR RIDGE	Upper Juniata	JUNIATA RIVER	PA	1966	51	400	-78.0317	40.64
50. SARGASO	Deerfield	DEERFIELD RIVER	VT	1922	50	412	-73.9333	42.8667
51. SPOKA SPRINGS	North Umqua	N. UMPQUA R	OR	1952	126	412	-122.5117	43.3017
52. WAKARA	Upper Roanoke	ROANOKE	VA	1906	60	435	-78.9766	37.2444
53. FLATRON	Big Thompson	CHIMNEY HOLLOW CREEK	CO	1952	88	438	-105.2333	40.3683
54. CLEAR HILL DAM	Housatonic	HOUSTATONIC RIVER	CT	1898	109	445	-73.4873	41.8667
55. FROO LAKE DAM A	Clackamas	CLACKAMAS	OR	1955	90	460	-122.0406	45.59
56. FROO LAKE DAM B	Clackamas	CLACKAMAS	OR	1955	70	460	-122.0684	45.1217
57. ACQUICKS	Inferior Puato Rico	RIO GRANDE DE ARICIBO	PR	1950	80	465	-68.7316	18.0116
58. YAHLECAD	Culebrinas-Ouanalibo	RIO BLANCO	PR	1950	80	470	-68.816	18.2193
59. CHATELAIN BRIDGE	Upper Bear, California	DRY CREEK	CA	1914	86	490	-120.54	38.7193

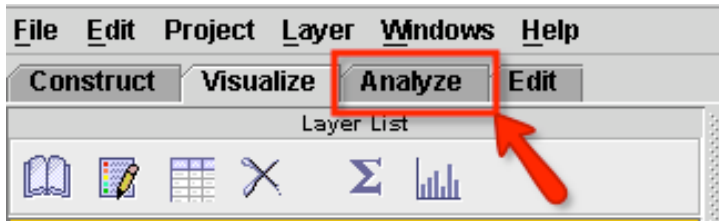


Step 4: Use the analysis tools to create a new layer. (Questions 6 - 10)

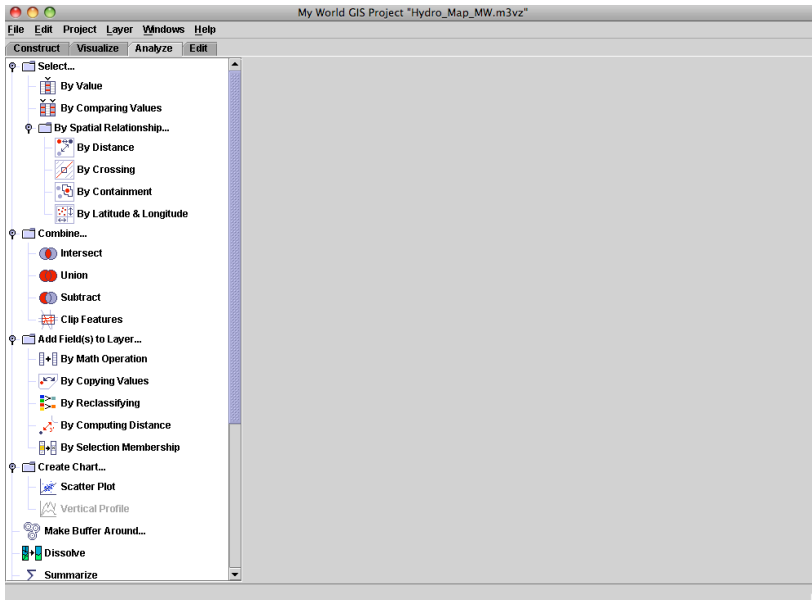
How many hydroelectric power dams are between 300 and 500 feet tall?

We are going to create a new GIS layer that will display all the hydroelectric power dams that are between 300 and 500 feet tall.

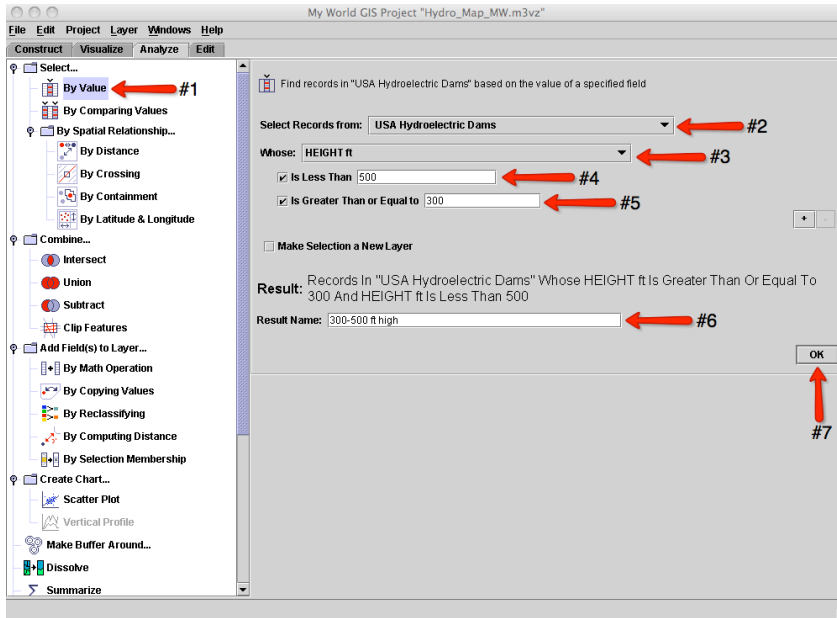
- a. Click on the **Analyze** tab above the **Layer List** (see arrow below).



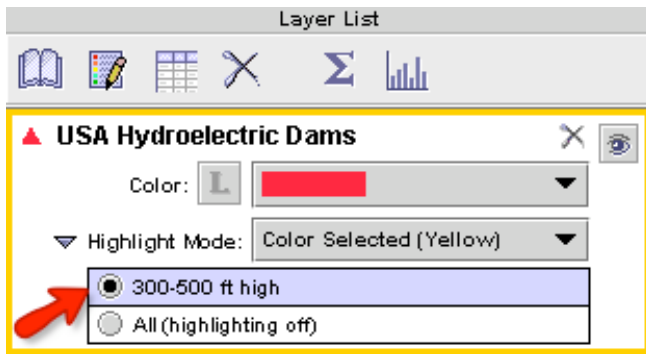
My World GIS will display the window below.



- b. Click **By Value** (see arrow #1 below).
 Click the box to the right of **Select Records from** and select **USA Hydroelectric Dams** from the list if it is not already selected (see arrow #2 below).
 Click the box to the right of **Whose** and select **HEIGHT ft** from the list (see arrow #3 below).
Check the box to the left of **Is Less Than**, and type **500** in the text box (see arrow #4 below).
Check the box to the left of **Is Greater Than or Equal to**, and type **300** in the text box (see arrow #5 below).
 Type **300-500 ft high** in the **Result Name** text box (see arrow #6 below).
 Click **OK** (see arrow # 7 below).



My World GIS will add a sublayer called **300-500 ft high** to the **USA Hydroelectric Dams** layer (see arrow below).
 Look at map display. These dams are highlighted in yellow.



- c. Click on the **table** icon  on the **Layer List** tool bar.



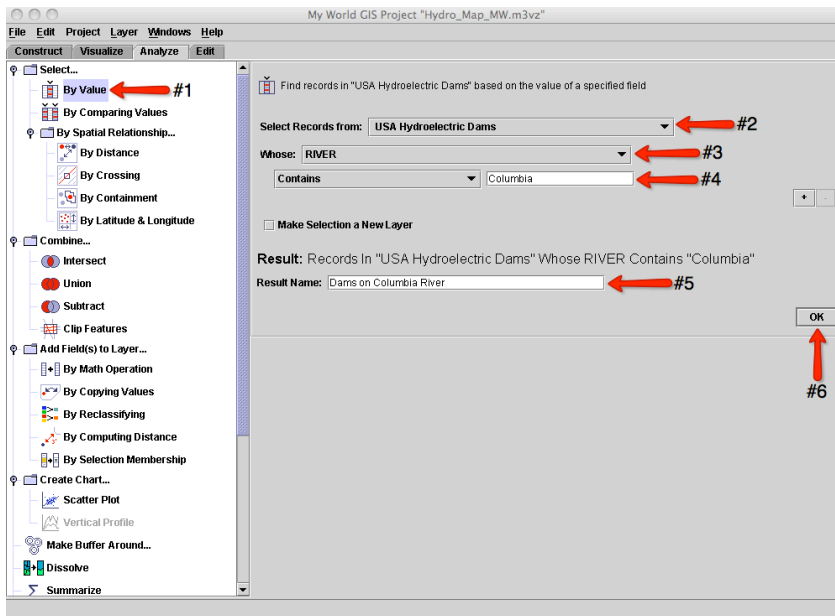
Instruct students to use the data table to answer **question 6** on their investigation sheet.

- d. Close the 300-500 ft high window.

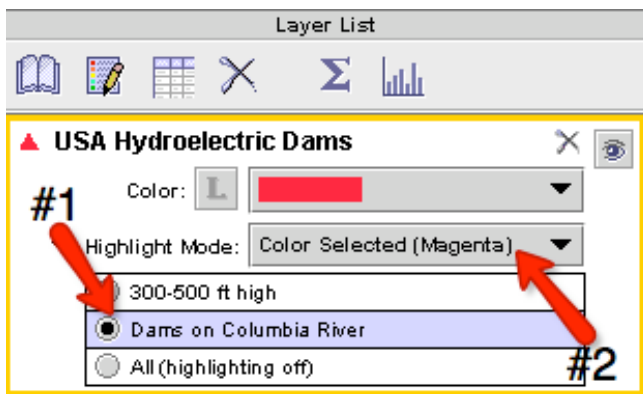
How many dams on the Columbia River generate electricity?

- e. Click on the **Analyze** tab above the **Layer List**.
 Click **By Value** (see arrow #1 below).
 Click the box to the right of **Select Records from** and select **USA Hydroelectric Dams** from the list if it is not already selected (see arrow #2 below).
 Click the box to the right of **Whose** and select **RIVER** from the list (see arrow #3 below).

Type **Columbia** in the text box to the right of **Contains** (see arrow #4 below).
 Type **Dams on Columbia River** in the **Result Name** text box (see arrow #5 below).
 Click **OK** (see arrow #6 below).



My World GIS will add a sublayer called **Dams on Columbia River** to the **USA Hydroelectric Dams** layer (see arrow #1 below).



- f. Click the box to the **right of Highlight Mode** and click on **Color Selected (Magenta)** (see arrow #2 above). This will change the color of the dams on the Columbia River to Magenta.

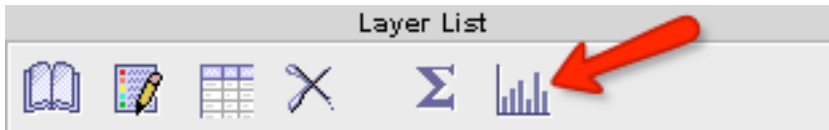


Instruct students to use the GIS map and the Dams on Columbia River data table to answer **questions 7 - 10** on their investigation sheet.

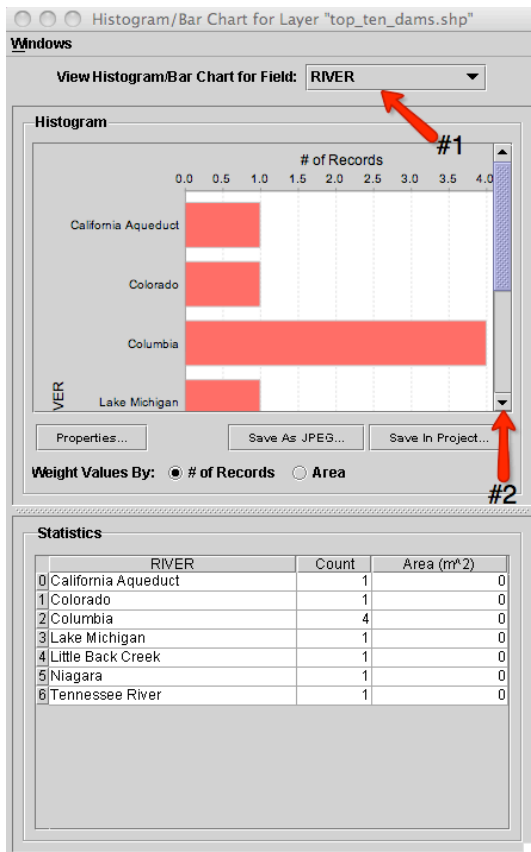


Step 5: Query and analyze the 10 most powerful US hydroelectric dams. (Questions 11 - 15)

- Click on the second layer **top_ten_dams.shp** in the **Layer List**.
- Click on the **histogram/bar chart** icon on the **Layer List tool bar** (see arrow below). A histogram/bar chart for the **top ten dams** layer will open.



- Click on the box to the right of **View Histogram/Bar Chart for Field** and select **RIVER** (see arrow #1 below). The histogram/bar chart will display rivers that host the top 10 most powerful US hydroelectric power dams and the number of dams on each river. Scroll down to see the whole histogram/bar chart (see arrow #2 below).




Instruct students to use the histogram/bar chart to answer **questions 11** and **12** on their investigation sheet.

- d. Click on the box to the right of **View Histogram/Bar Chart for Field** and select **STATE**. The histogram/bar chart will display the states in which the top 10 most powerful US hydroelectric power dams are located and the number of dams in each state.



Instruct students to use the histogram/bar chart to answer **question 13** on their investigation sheet.

- e. Close the **Histogram/Bar Chart** window.

- f. Click on the **table** icon  on the **Layer List tool bar**. A data table for the **top ten dams** layer will open. This table includes a new field for these dams: **CAPACITY MW**. This is the amount of energy production that the dam generates. The units are megawatts. 1 megawatt is equal to 1,000,000 watts. Recall that when your television is on, it uses about **137 Watts** of electricity each second it is on.



Instruct students to use the table data to answer **questions 14 and 15** on their investigation sheet.



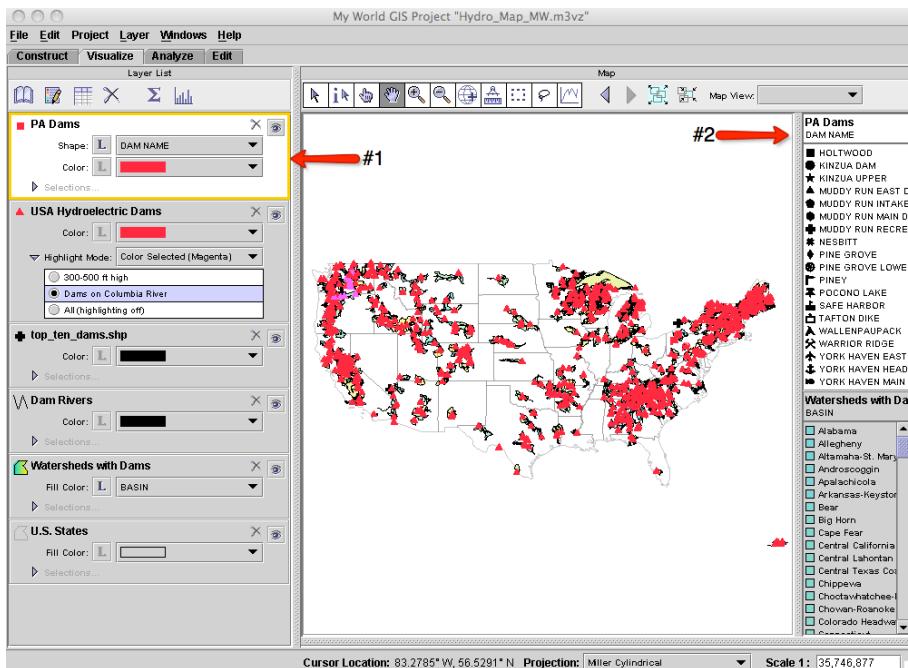
Step 6: Create a new GIS layer for Pennsylvania dams.

- a. Click on the **Analyze** tab above the **Layer List**.
Click **By Value**.
Click the box to the right of **Select Records from** and select **USA Hydroelectric Dams** from the list.
Click the box to the right of **Whose** and select **STATE** from the list.
Type **PA** in the text box to the right of **Contains**.
Check the box to the left of **Make Selection a New Layer** (see below).


Make Selection a New Layer


Type **PA Dams** in the **Result Name** text box.
Click **OK**.


My World GIS will add a new layer called **PA Dams** to the Layer List (see arrow #1 below) and the names of the PA Dams in the panel on the right (see arrow #2 below).




 **Step 7: Query and analyze hydroelectric power dams in Pennsylvania.**
(Questions 16 - 23)

- a. Click on the **table icon**  on the **Layer List tool bar**. A data table for the **PA Dams** layer will open.

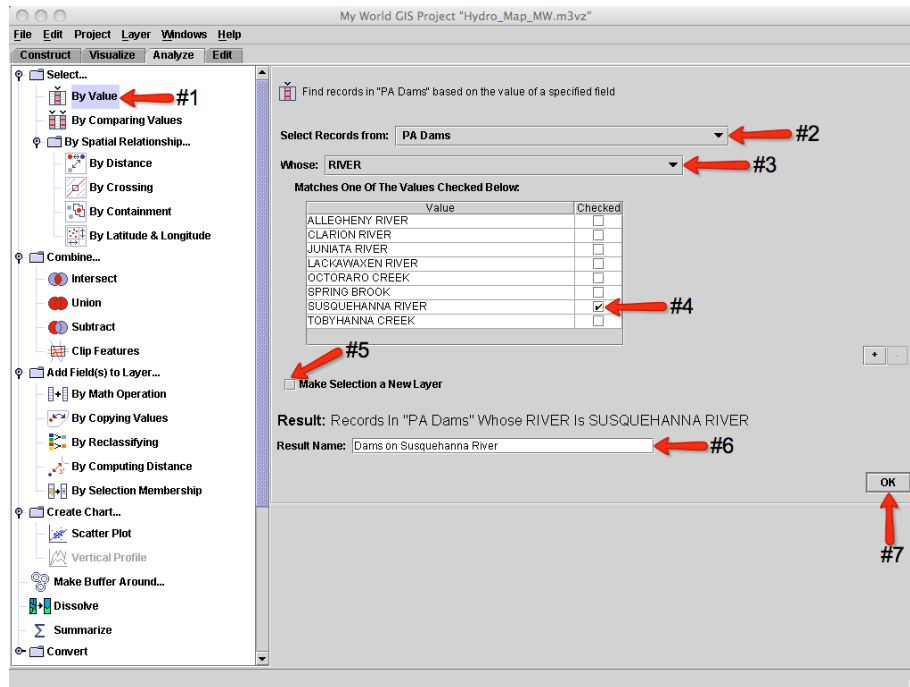
 Instruct students to use the PA Dams data table to answer the **questions 16 - 20** on their investigation sheet.

- b. Click on the **histogram/bar chart icon**  on the **Layer List tool bar**. A histogram/bar chart for the **PA Dams** layer will open.
- c. Click on the box to the right of **View Histogram/Bar Chart for Field** and select **WATERSHED**. The histogram/bar chart will display watersheds that host Pennsylvania hydroelectric power dams and the number of dams in each watershed.

 Instruct students to answer question **21** on their investigation sheet.

- d. Click on the **Analyze** tab above the **Layer List**.
Click **By Value** (see arrow #1 below).
Click the box to the right of **Select Records from** and select **PA Dams** from the list (see arrow #2 below).
Click the box to the right of **Whose** and select **RIVER** from the list (see arrow #3 below).

Check the box to the right of **SUSQUEHANNA RIVER** (see arrow #4 below).
 Uncheck the box to the left of **Make Selection a New Layer** (see arrow #5 below).
 Type **Dams on Susquehanna River** in the **Result Name** text box (see arrow #6 below).
 Click **OK** (see arrow #7 below).




My World GIS will add a sublayer called **Dams on Susquehanna River** to the **PA Dams** layer.

Click the box to the **right** of **Highlight Mode** and click on **Color Selected (Magenta)**. This will change the color of PA dams on the Susquehanna River to Magenta.



Instruct students to use the GIS map to answer **question 22** on their investigation sheet.

- e. Click on the **table** icon  on the **Layer List tool bar**. A data table for **Dams on Susquehanna River** sublayer will open.



Instruct students to use the data table to answer **question 23** on their investigation sheet.