MEETING NOTES

SOUTH CAROLINA ELECTRIC & GAS COMPANY
Fisheries TWC Meeting

April 1, 2014

Final KDM 05-06-14

ATTENDEES:

Bill Marshall (SCDNR)
Milton Quattlebaum (SCANA)
Steve Summer (SCANA)
Henry Mealing (Kleinschmidt)
Dick Christie (SCDNR)
Kelly Miller (Kleinschmidt)
Byron Hamstead (USFWS)
Bill Argentieri (SCE&G)
Ray Ammarell (SCE&G)
Randy Mahan (SCANA)
Hal Beard (SCDNR)
Fritz Rohde (NOAA) via conference call
Vivianne Vejdani (SCDNR)
Gerrit Jobsis (American Rivers)

These notes serve to be a summary of the major points presented during the meeting and are not intended to be a transcript or analysis of the meeting.

Henry opened the meeting with introductions. Ray then gave the group a presentation on lake level fluctuations. This presentation was an updated version of the one given at the last Fisheries TWC meeting, held on December 19, 2013. Ray addressed the stakeholder requests to examine wet and dry years and how they might affect fluctuations. He also added in data collected in 2013. The updated presentation is included at the end of these notes.

After Ray's presentation, the group reviewed the comments received from SCDNR on the Fluctuation Study Plan. Dick mentioned that some of the comments submitted may not be applicable anymore, after discussion with members of the TWC. Henry said that many of SCDNR's comments were actually related to the addition of more information on the fish that could be affected by the fluctuations.

In Section 2.0, information is included on the percentage of shoreline that is affected by the fluctuations at Parr and Monticello Reservoir. SCDNR mentioned that this information was very important to them. Henry said that mitigation efforts at Monticello Reservoir should be focused on areas with gentle slopes (less than 25% slope), which are typically found in the upstream portions of the reservoir. There is a higher potential for habitat enhancement in these areas. Dick said that collecting elevations at study sites needs to be listed in the study objectives section. He said that elevation of habitat enhancements (spawning benches, gravel beds, ect.) is critical to their successfulness. Largemouth bass are obviously spawning in Monticello Reservoir, most likely in deeper waters, because that is the more stable habitat in relation to water levels. Therefore, having a spawning bench that is located 1-2 feet below low pool (which is covered by approximately 5 feet during high pool) would be expected to be used by fish. Dick mentioned the need to evaluate the feasibility of various enhancement measures so that accurate recommendations can be made. He suggested evaluating centrarchids, which spawn in summer months in Monticello Reservoir.

SCDNR submitted a comment on the study plan requesting the use of the Recreation Lake as a control to help evaluate the impacts in Monticello Reservoir. The group decided that this was unnecessary since the objective of the study at Monticello Reservoir is more qualitative. Dick said that since we already have determined how much shoreline can be exposed in Monticello Reservoir during fluctuations (approximately 333 acres), it is more important to focus on enhancement measures than to spend a lot of effort on quantifying impacts.

SCDNR is less interested in exploring habitat enhancements on Parr Reservoir because the potential for making meaningful habitat enhancements on Parr would be difficult due to of the magnitude of fluctuations. Monticello Reservoir has a lower magnitude of fluctuation where habitat enhancement has a better chance of benefitting the aquatic resource. Gerrit said that American Rivers isn't interested in skipping to mitigation without considering the possibility of adjusting the fluctuation range. He said that it is state law to maintain navigable waters, which isn't always something that can be mitigated. Gerrit said he has heard many people say it is difficult to navigate Parr Reservoir and so we need to determine what the navigation hindrance is and quantify it. Henry said this is why a quantification element was included in the study plan. Henry said if Gerrit has specific information from boaters and anglers on locations where navigation is difficult, he should share this information so that it can be considered during the study. Milton and Steve identified a few areas in Parr Reservoir where navigation could possibly be an issue, and so transects will be established in these areas during the study. The group discussed the state navigation criteria for rivers. There are no state-established navigation criteria for reservoirs. Hal said that the navigability of a reservoir or river also depends on the experience of the navigator. Bill M. said that it is important that people can get in and out of the boat ramps on Parr Reservoir. This information will be collected during the proposed Recreation Use and Needs Study that will be included in the PAD. Viviane shared that SCDHEC has a general "guideline" that no more than one-third the waterway should be obstructed for navigation by a proposed structure. This relates to building a structure in the waterway but could be interpreted that one-third the waterway should be left open for public navigation. The group continued to discuss the possibility of establishing navigation criteria for reservoirs. Byron asked the TWC if determining navigation criteria is necessary before approving the proposed methodology in the study plan. Should we focus on finalizing the methodology proposed in the study plan and discuss navigation criteria later? Henry mentioned that one way to improve navigation in Parr Reservoir is to increase signage and create maps that display the best navigation routes.

The group decided to amend the study plan so that the study objectives are listed separately for Parr and Monticello Reservoirs. It was also discussed that the Parr study would include data that would help qualify how reservoir fluctuations may affect navigation in the reservoir. For example what happens when there is a 5 ft or 9 ft drawdown? What portions of the reservoir are potentially impacted in relation to dewatering of aquatic habitat and constricted channel (navigation).

Henry reminded the group that the fluctuation study will not include the same methodology as an IFIM study. This study will focus more on documenting the reservoirs at various pool elevations through pictures and some transect data. Henry said that TWC members are welcome to help choose the transects for each reservoir. Byron said that identifying slope (bed topography) and documenting habitat type along each transect will address the USFWS's concerns regarding impacted habitat.

Gerrit mentioned that the polygons on the maps included in the study plan need to extend from shoreline to shoreline. Milton said he would change the maps to show this.

The group then discussed the methodology for studying Monticello Reservoir. The group decided that pictures will be taken along the shoreline to document effects. Henry also said that the group can pick two characteristic areas, such as a cove or an island, to document for use in determining appropriate mitigation measures. The group then looked at some pictures Dick pulled together displaying the various types of habitat enhancements that could be used at Monticello. Hal asked how much area is going to be covered with enhancements and is this only going to be done one time. Dick said that all of those terms will be negotiated later in the process. Vivianne said that an Army Corps of Engineers permit may be required before installing any fish attractors. This is something the group needs to keep in mind later in the process.

Bill M. asked if the group foresees any habitat enhancement at Parr. Henry said that enhancement measures could possibly be implemented in backwater areas. Hal said that he believes enhancement efforts should be focused on areas that are more likely to get a response from fish, such as in Monticello Reservoir. The group decided to focus on identifying areas in Parr Reservoir to study and evaluate the potential for enhancement measures pending the results of the study.

Edits will be made to the study plan including separating the objectives section into two subsections for Parr and Monticello. The edited objectives section will be distributed to the TWC for approval via email. A complete draft version of the study plan will then be sent out to the TWC and a meeting will be scheduled to discuss the edits. Action items stemming from this meeting are listed below.

ACTION ITEMS:

- Kleinschmidt will revise the study plan to include comments and edits discussed at the meeting. The revised draft study plan will be sent to TWC members for further review and a Fisheries TWC meeting will be scheduled to discuss the revised plan.

- Milton will redo the maps in the study plan to ensure the polygons extend from shoreline to shoreline.

Parr & Monticello Reservoir Fluctuation Update

Parr Hydroelectric Project Relicensing

Fisheries Technical Working Committee

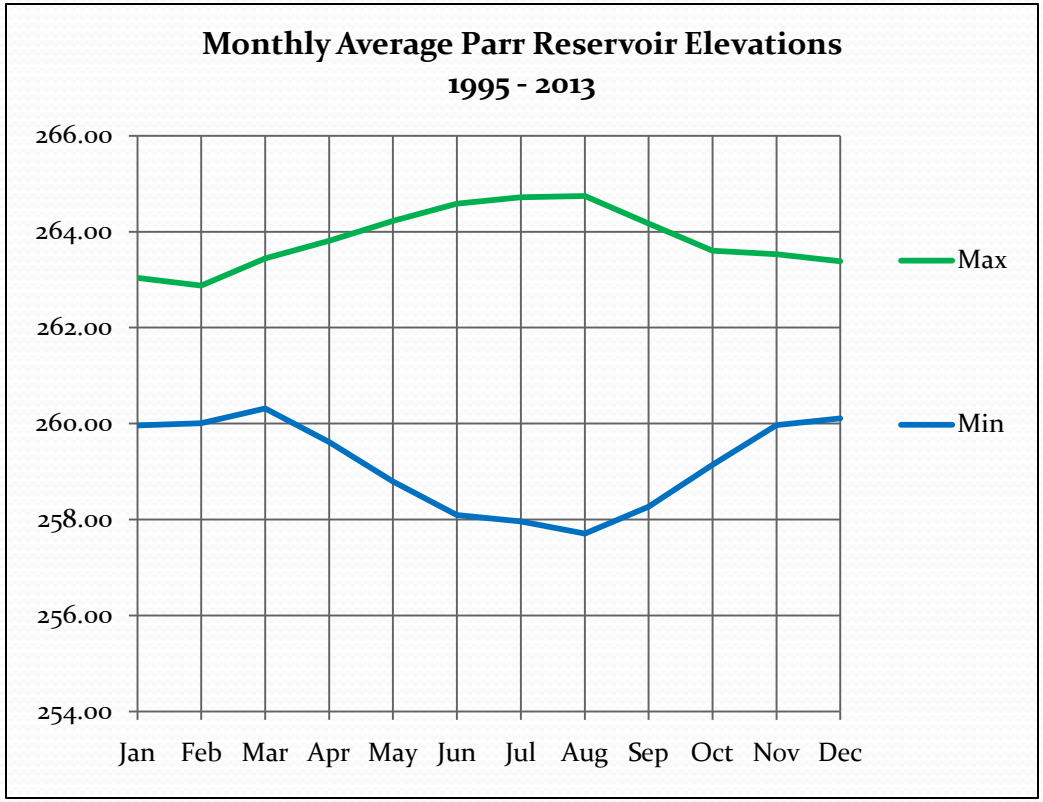
April 1, 2014

Reservoir Data

- Daily minimum and maximum Parr Reservoir levels from USGS station 02160990, Parr Shoals Reservoir at Parr, SC; period of record 1995-2013.
- Daily minimum and maximum Monticello Reservoir levels from SCE&G data; period of record 2005-2013.

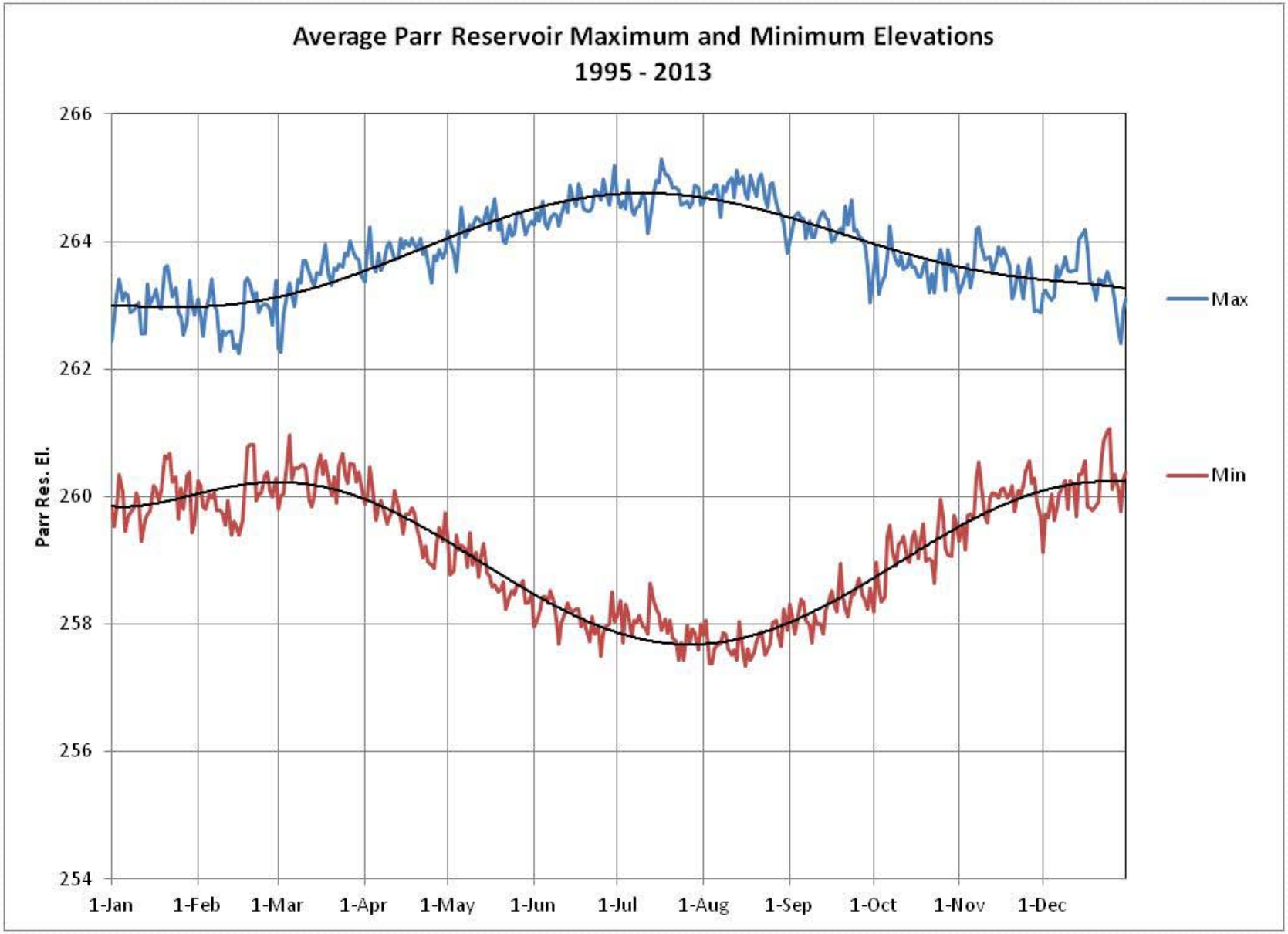
Parr Reservoir Monthly Data 1995-2013

Monthly Average Res. Elev.			
	Max	**Min**	**Range**
Jan	263.04	259.96	3.08
Feb	262.88	260.01	2.87
Mar	263.44	260.32	3.13
Apr	263.81	259.61	4.20
May	264.22	258.79	5.43
Jun	264.59	258.09	6.49
Jul	264.72	257.96	6.75
Aug	264.74	257.71	7.03
Sep	264.17	258.27	5.90
Oct	263.60	259.14	4.46
Nov	263.53	259.97	3.56
Dec	263.38	260.11	3.28
Average	**263.84**	**259.16**	**4.68**



Parr Reservoir Average Daily Fluctuation 1995-2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2.63	2.85	2.51	3.49	4.83	6.29	6.63	6.80	5.69	5.38	3.92	4.17
2	3.27	2.64	2.25	3.87	5.21	6.42	6.17	6.69	6.08	4.96	3.76	3.56
3	3.33	2.67	2.80	3.77	4.99	6.16	6.92	7.39	6.56	4.63	4.29	3.56
4	3.06	3.10	2.64	3.49	4.13	6.21	6.22	7.37	6.31	5.00	3.93	3.06
5	3.00	3.10	2.38	3.88	4.85	5.85	6.79	7.26	5.98	5.04	3.55	3.55
6	3.74	3.44	2.89	3.97	5.29	5.86	6.72	7.23	6.01	4.41	3.92	3.81
7	3.48	2.93	2.53	3.60	4.89	5.85	6.36	6.70	6.01	4.70	3.91	3.46
8	3.14	3.13	2.98	3.84	5.23	6.08	6.52	6.99	6.33	4.76	3.68	3.53
9	3.11	2.51	2.87	4.35	4.82	6.37	6.43	6.95	6.35	4.79	3.77	3.61
10	2.97	2.87	3.20	4.30	5.29	6.56	6.80	7.31	5.93	4.38	4.03	3.78
11	3.11	2.99	3.25	4.08	5.26	6.40	6.71	7.48	6.25	4.50	4.16	3.43
12	3.26	2.64	3.57	3.62	5.62	6.46	6.30	7.10	6.43	4.21	3.78	3.50
13	2.92	3.22	3.55	3.90	5.25	6.13	5.75	7.69	6.63	4.61	3.48	3.88
14	3.61	2.72	3.28	4.40	5.05	6.65	6.44	6.87	6.16	4.79	3.66	3.79
15	3.26	2.85	3.09	4.46	5.74	6.52	6.72	7.44	6.01	4.27	3.94	3.82
16	2.96	2.86	2.83	4.28	5.43	6.32	6.77	7.42	5.46	4.14	3.66	3.72
17	3.14	3.03	3.37	4.21	5.90	6.68	7.38	7.05	5.74	4.42	3.76	4.20
18	3.04	3.17	3.39	4.22	6.05	6.79	7.00	7.60	5.92	4.10	3.77	3.64
19	2.88	2.65	3.21	4.22	5.67	6.44	7.17	7.28	5.25	4.04	3.58	3.61
20	2.95	2.51	3.30	4.38	5.79	6.61	6.92	6.99	5.69	4.72	2.92	3.28
21	3.03	2.30	3.29	4.77	5.35	6.76	7.05	7.14	6.32	4.16	3.47	3.60
22	2.73	3.27	3.65	4.75	5.74	6.43	7.13	7.17	6.15	4.50	3.53	2.86
23	2.91	2.85	3.16	4.67	5.84	6.98	7.39	7.16	6.18	4.56	3.31	2.42
24	2.98	2.92	2.93	4.71	5.57	6.82	6.86	6.93	5.71	4.31	2.93	2.55
25	3.23	2.71	3.47	4.42	5.65	7.16	7.16	7.19	5.60	3.92	3.04	2.39
26	2.69	2.61	3.56	4.92	5.85	7.11	6.66	6.91	5.37	4.00	3.28	3.16
27	2.74	2.86	3.50	4.44	5.85	6.82	6.84	6.56	5.58	4.05	3.11	2.81
28	2.44	2.70	3.32	4.36	5.65	6.58	6.70	6.66	5.55	4.80	2.65	2.61
29	3.01	3.11	3.51	4.44	5.78	6.34	7.03	6.76	5.38	4.46	3.08	2.72
30	3.59		3.34	4.09	5.90	7.15	7.26	6.05	4.47	3.88	3.31	2.76
31	3.26		3.29		5.86		6.57	5.92		3.87		2.78
Average	**3.08**	**2.87**	**3.13**	**4.20**	**5.43**	**6.49**	**6.75**	**7.03**	**5.90**	**4.46**	**3.57**	**3.34**

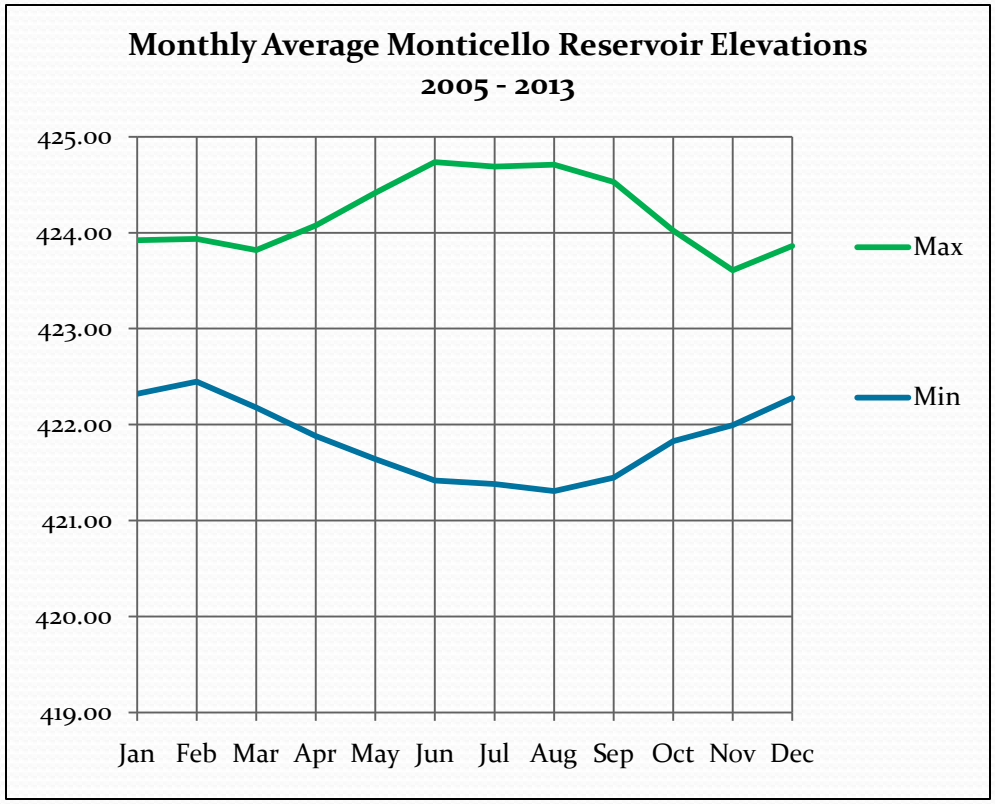

Average Parr Reservoir Maximum and Minimum Elevations
1995 - 2013
Parr Res. El.
266
264
262
260
258
256
254
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Max
Min

Parr Reservoir Summary

- February has smallest average fluctuation – 2.87 feet.
- August has largest average fluctuation – 7.03 feet.
- Average fluctuation for year is 4.68 feet.
- Average fluctuation March – May is 4.25 feet.
- Average fluctuation April – July is 5.72 feet.

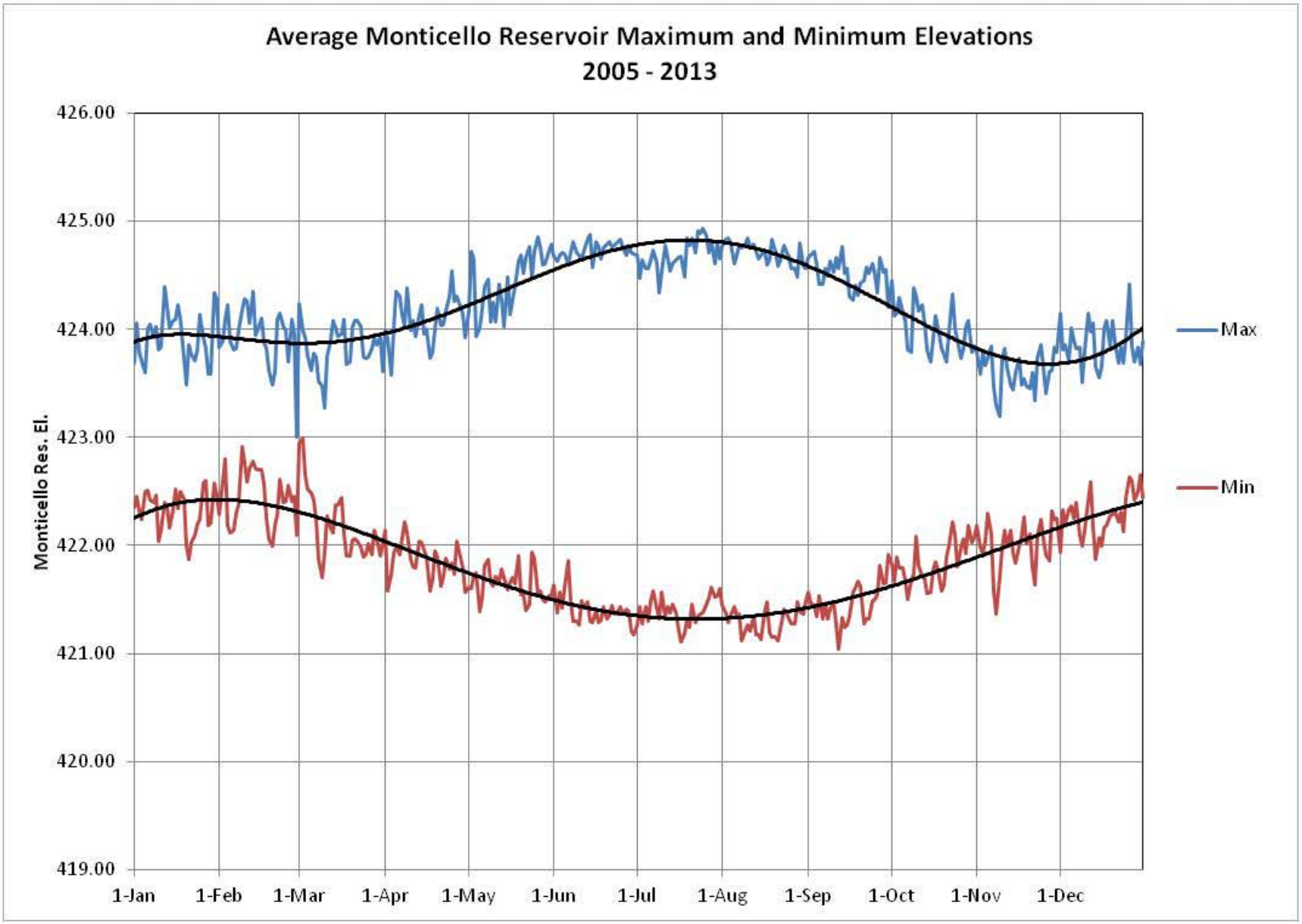
Monticello Reservoir Monthly Data 2005-2013

Monthly Average Res. Elev.			
	Max	**Min**	**Range**
Jan	423.92	422.32	1.60
Feb	423.93	422.45	1.49
Mar	423.82	422.18	1.66
Apr	424.08	421.88	2.22
May	424.42	421.64	2.80
Jun	424.74	421.42	3.33
Jul	424.69	421.38	3.29
Aug	424.71	421.31	3.40
Sep	424.53	421.45	3.06
Oct	424.02	421.83	2.18
Nov	423.61	422.00	1.61
Dec	423.86	422.28	1.58
Average	**424.19**	**421.84**	**2.35**



Monticello Reservoir Average Daily Fluctuation 2005-2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.33	1.54	1.29	1.84	2.56	3.04	3.42	3.33	3.10	2.63	1.60	2.21
2	1.60	1.29	1.00	2.33	3.12	3.26	3.04	3.45	3.22	2.46	1.61	1.48
3	1.47	1.29	1.28	1.84	2.93	3.12	3.37	3.56	3.28	2.26	1.87	1.64
4	1.47	2.03	1.23	2.09	2.19	3.29	3.13	3.44	3.26	2.50	1.63	1.38
5	1.10	1.77	1.13	2.37	2.62	3.09	3.27	3.18	2.89	2.37	1.43	1.64
6	1.49	1.67	1.36	2.39	2.67	2.76	3.16	3.34	3.10	2.40	1.73	1.64
7	1.62	1.52	1.50	2.06	2.59	3.22	3.16	3.41	3.10	2.31	1.89	1.42
8	1.52	1.61	1.66	1.81	2.59	3.51	3.20	3.63	3.18	2.11	1.93	1.73
9	1.56	1.27	1.78	2.27	2.41	3.41	3.01	3.58	3.22	2.66	1.48	1.52
10	1.78	1.51	1.34	2.12	2.62	3.42	2.97	3.58	3.06	2.22	1.74	1.66
11	1.69	1.67	1.47	2.28	2.36	3.16	3.43	3.54	3.40	2.36	1.68	1.72
12	2.00	1.34	1.73	2.14	2.76	3.31	3.23	3.44	3.52	2.51	1.66	1.39
13	1.84	1.57	1.96	2.09	2.49	3.36	3.17	3.54	3.43	2.37	1.34	1.89
14	1.84	1.23	1.63	2.20	2.32	3.58	3.16	3.48	3.28	2.26	1.52	1.79
15	1.74	1.30	1.56	2.00	2.90	3.29	3.27	3.56	3.30	2.13	1.77	1.49
16	1.57	1.40	1.51	2.11	2.48	3.41	3.44	3.34	2.96	2.14	1.74	1.67
17	1.88	1.31	1.98	2.16	2.57	3.48	3.57	3.12	2.70	2.28	1.41	1.83
18	1.59	1.57	1.78	2.11	2.76	3.34	3.30	3.44	2.80	2.24	1.28	1.89
19	1.30	1.57	1.80	2.06	2.73	3.32	3.52	3.68	2.64	2.24	1.47	1.57
20	1.50	1.50	1.98	2.30	3.14	3.47	3.53	3.57	2.81	2.13	1.34	1.79
21	1.99	1.42	2.02	2.41	2.98	3.46	3.39	3.47	3.18	1.81	1.81	1.56
22	1.74	1.80	2.04	2.33	3.27	3.32	3.42	3.41	3.26	1.98	1.71	1.47
23	1.61	1.53	2.04	2.29	3.31	3.41	3.57	3.37	3.20	2.10	1.66	1.52
24	1.61	1.62	1.86	2.52	2.54	3.42	3.52	3.34	3.12	1.90	1.61	1.56
25	1.89	1.58	1.82	2.71	2.84	3.40	3.56	3.36	3.01	2.10	1.59	1.48
26	1.34	1.15	1.73	2.52	3.31	3.39	3.41	3.29	2.79	1.76	1.50	1.79
27	1.22	1.68	1.91	2.27	3.18	3.28	3.20	3.29	2.86	1.77	1.76	1.24
28	1.40	1.50	1.78	2.32	3.10	3.39	3.21	3.01	2.89	2.10	1.30	1.28
29	1.38	0.90	1.80	2.34	3.13	3.50	3.09	3.41	2.90	1.89	1.59	1.33
30	1.76		2.02	2.36	3.19	3.52	3.27	3.22	2.29	1.77	1.53	1.02
31	1.81		1.60		3.26		3.06	3.08		1.78		1.44
Average	**1.60**	**1.49**	**1.66**	**2.22**	**2.80**	**3.33**	**3.29**	**3.40**	**3.06**	**2.18**	**1.61**	**1.58**


Average Monticello Reservoir Maximum and Minimum Elevations
2005 - 2013
Monticello Res. El.
426.00
425.00
424.00
423.00
422.00
421.00
420.00
419.00
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Max
Min

Monticello Reservoir Summary

- February has smallest average fluctuation: 1.49 feet.
- August has largest average fluctuation: 3.40 feet.
- Average fluctuation for year is 2.35 feet.
- Average fluctuation March – May is 2.23 feet.
- Average fluctuation April – July is 2.91 feet.

Annual Comparison Graphs

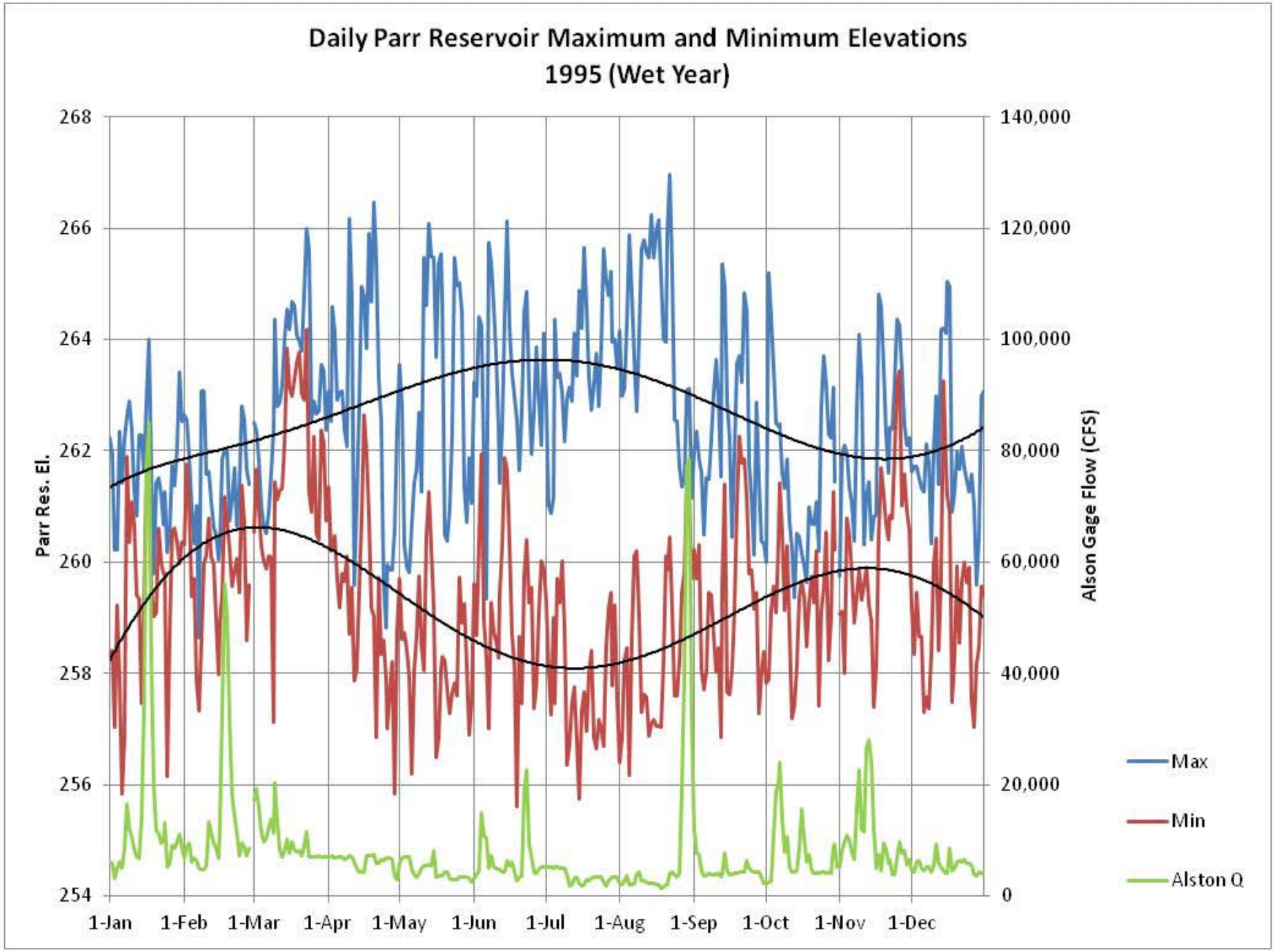
- Pairs of graphs for each year, one each for Parr Reservoir and Monticello Reservoir.
- Years are denoted as “Dry”, “Normal”, or “Wet” based on percentile rank of annual average flow at Alston gage site for each year during the period 1981 – 2013.
  - < 25th Percentile Rank = “Dry”, or Low Flow
  - 25th to 75th Percentile Rank = “Normal”
  - > 75th Percentile Rank = “Wet”, or High Flow
- Similar to USGS stream flow ranges.
- Added a polynomial best fit line to show overall trend.

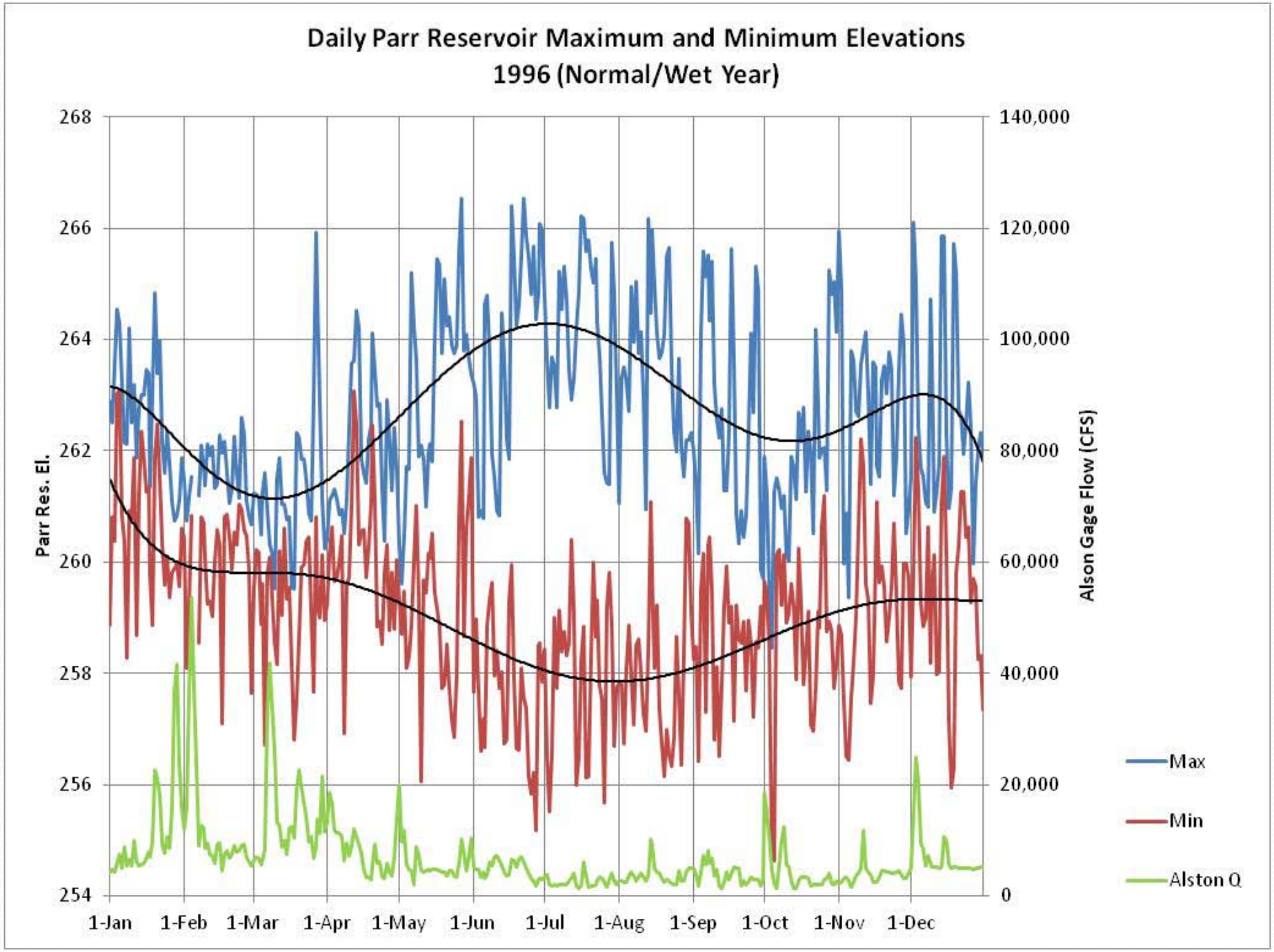
Flow Rankings by Year

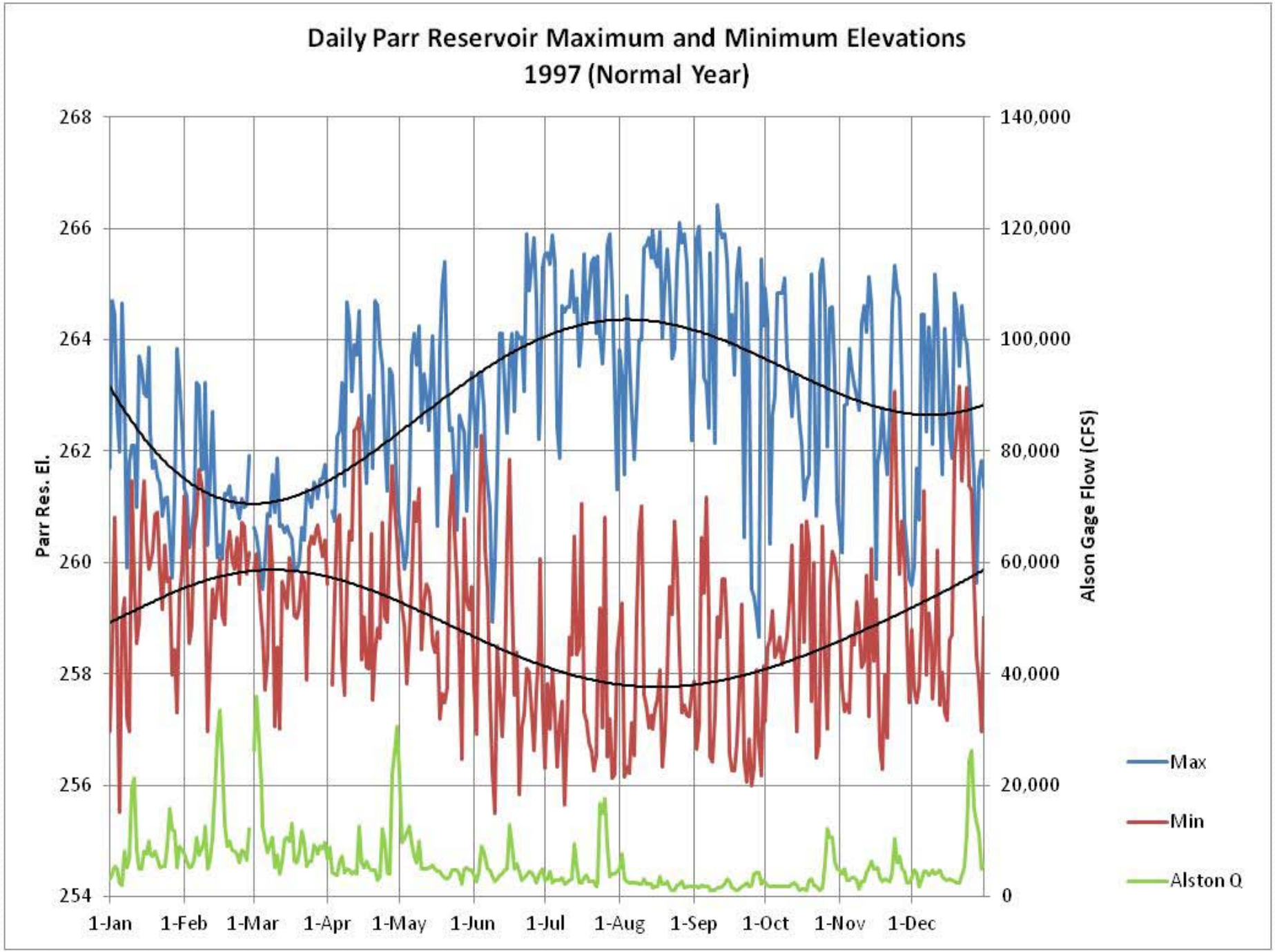
Year	Annual Mean Flow	P-Rank	Flow Range
1981	3313	29%	Normal
1982	6076	65%	Normal
1983	7399	84%	High
1984	7743	94%	High
1985	5295	48%	Normal
1986	4002	35%	Normal
1987	5795	58%	Normal
1988	2897	13%	Low
1989	5536	55%	Normal
1990	7203	81%	High
1991	6530	71%	Normal
1992	6821	74%	Normal
1993	7558	90%	High
1994	6091	68%	Normal
1995	8187	97%	High
1996	6917	77%	High
1997	5949	61%	Normal

Year	Annual Mean Flow	P-Rank	Flow Range
1998	7482	87%	High
1999	3350	32%	Normal
2000	3015	19%	Low
2001	2418	3%	Low
2002	3164	23%	Low
2003	8791	100%	High
2004	5146	45%	Normal
2005	5490	52%	Normal
2006	3186	26%	Normal/Low
2007	2922	16%	Low
2008	2115	0%	Low
2009	4718	42%	Normal
2010	4538	39%	Normal
2011	2483	6%	Low
2012	2499	10%	Low
2013	6459	69%	Normal

Red years were graphed for Parr Reservoir only. Green years were graphed for both Parr and Monticello Reservoirs.


Daily Parr Reservoir Maximum and Minimum Elevations
1995 (Wet Year)
Parr Res. El.
Alson Gage Flow (CFS)
268
266
264
262
260
258
256
254
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Max
Min
Alston Q


Daily Parr Reservoir Maximum and Minimum Elevations
1996 (Normal/Wet Year)
Parr Res. El.
Alson Gage Flow (CFS)
268
266
264
262
260
258
256
254
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Max
Min
Alston Q


Daily Parr Reservoir Maximum and Minimum Elevations
1997 (Normal Year)
Parr Res. El.
Alson Gage Flow (CFS)
268
266
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140,000
120,000
100,000
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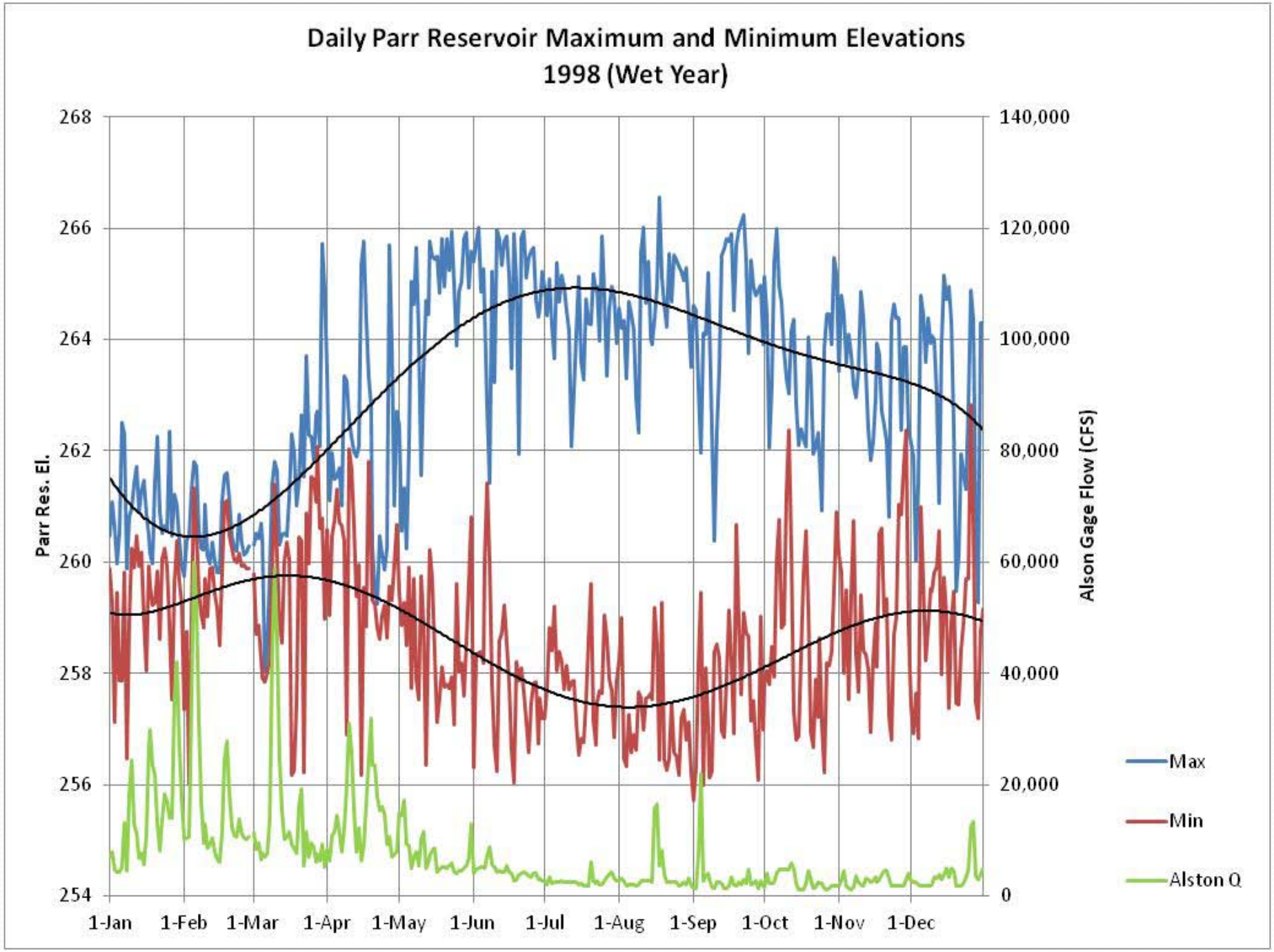
Daily Parr Reservoir Maximum and Minimum Elevations
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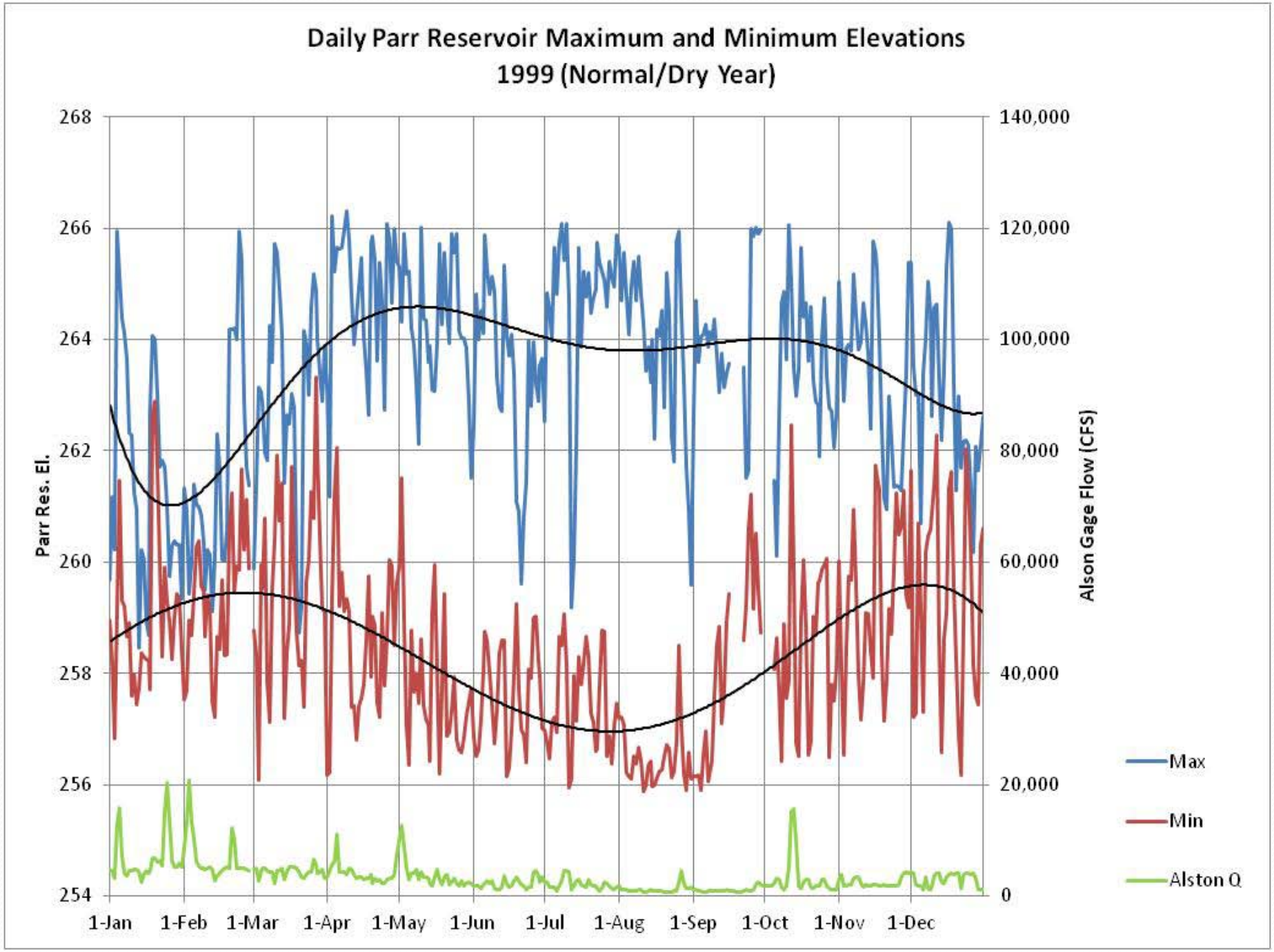
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1999 (Normal/Dry Year)
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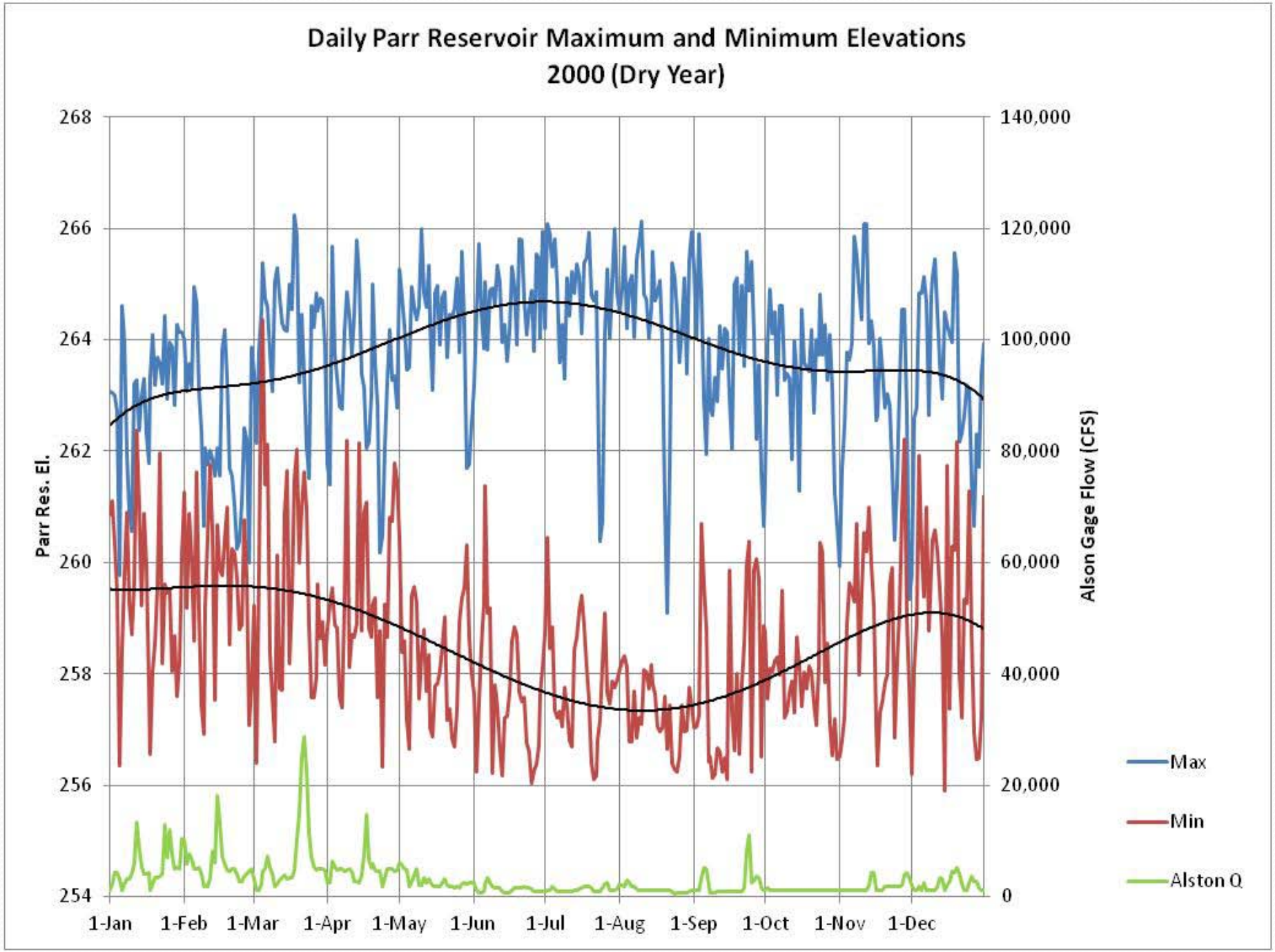
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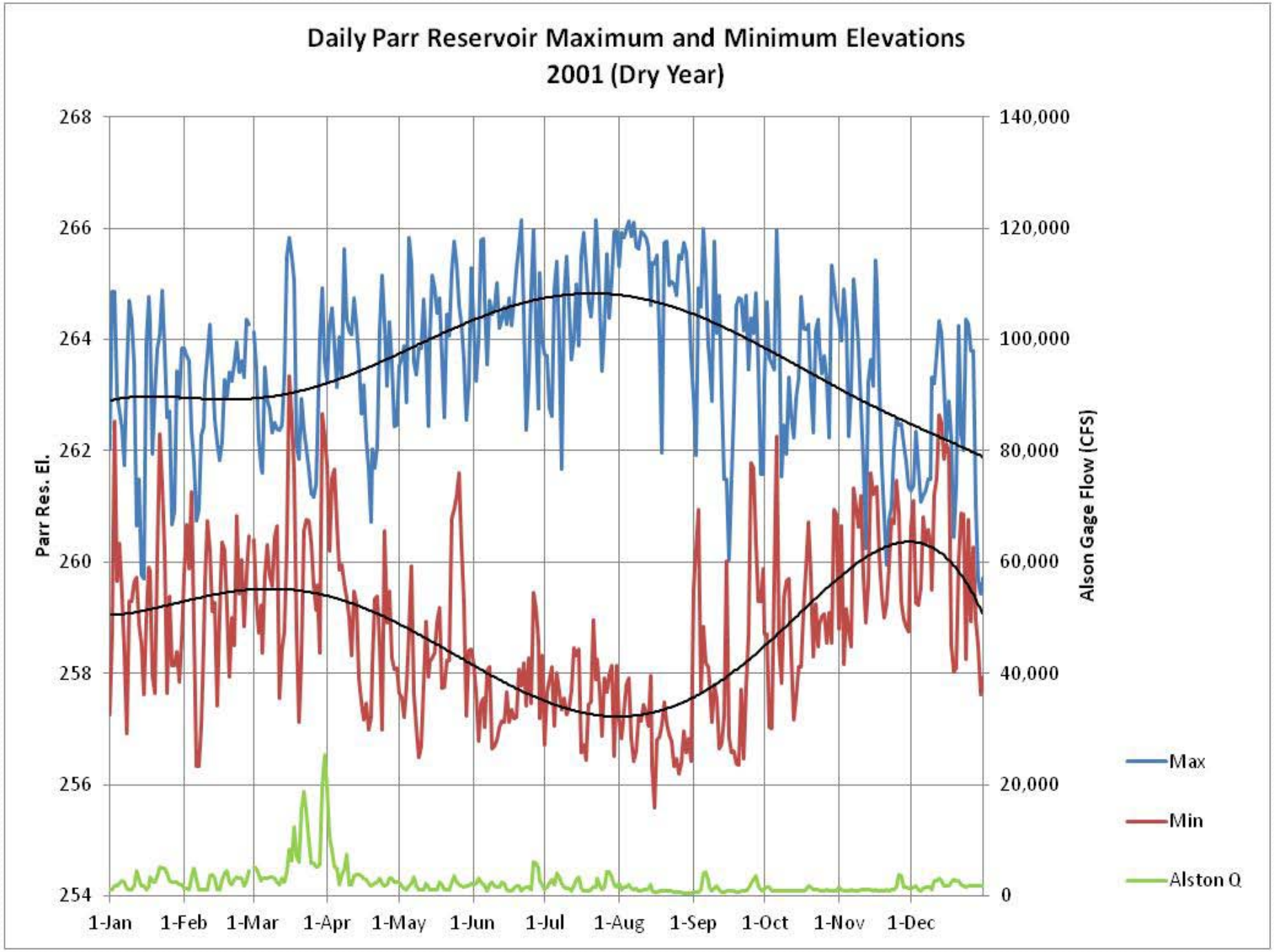
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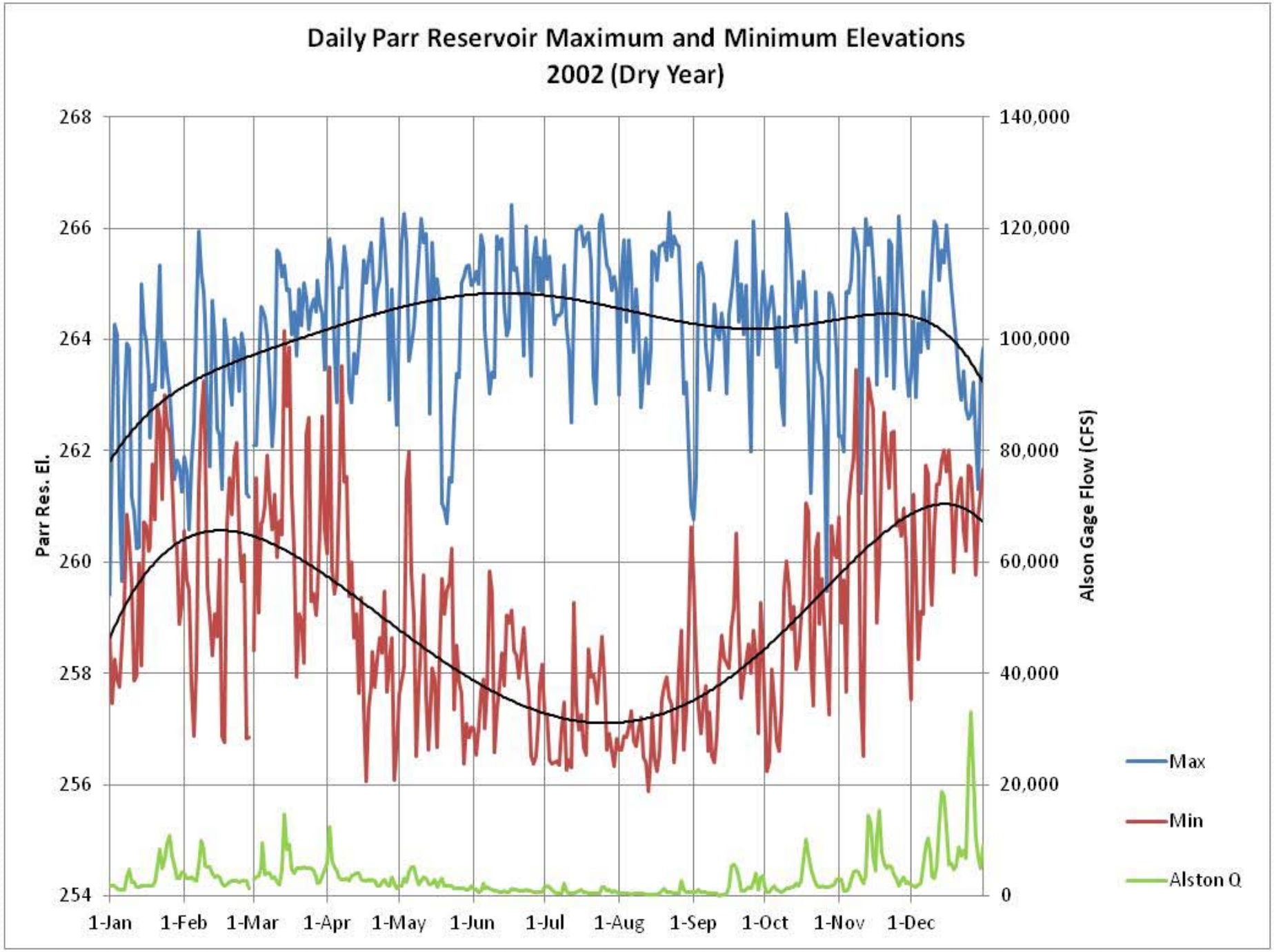
Daily Parr Reservoir Maximum and Minimum Elevations
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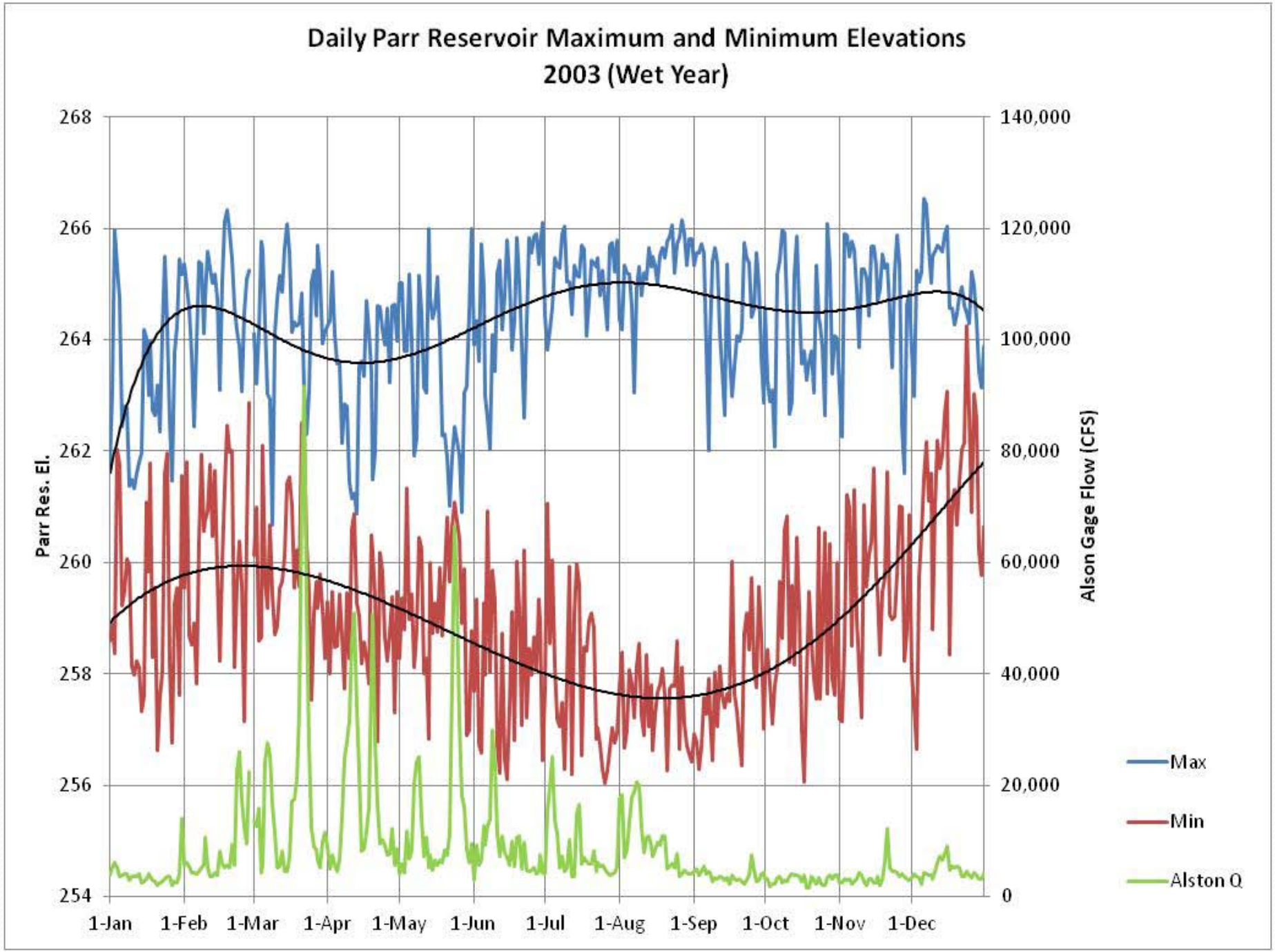
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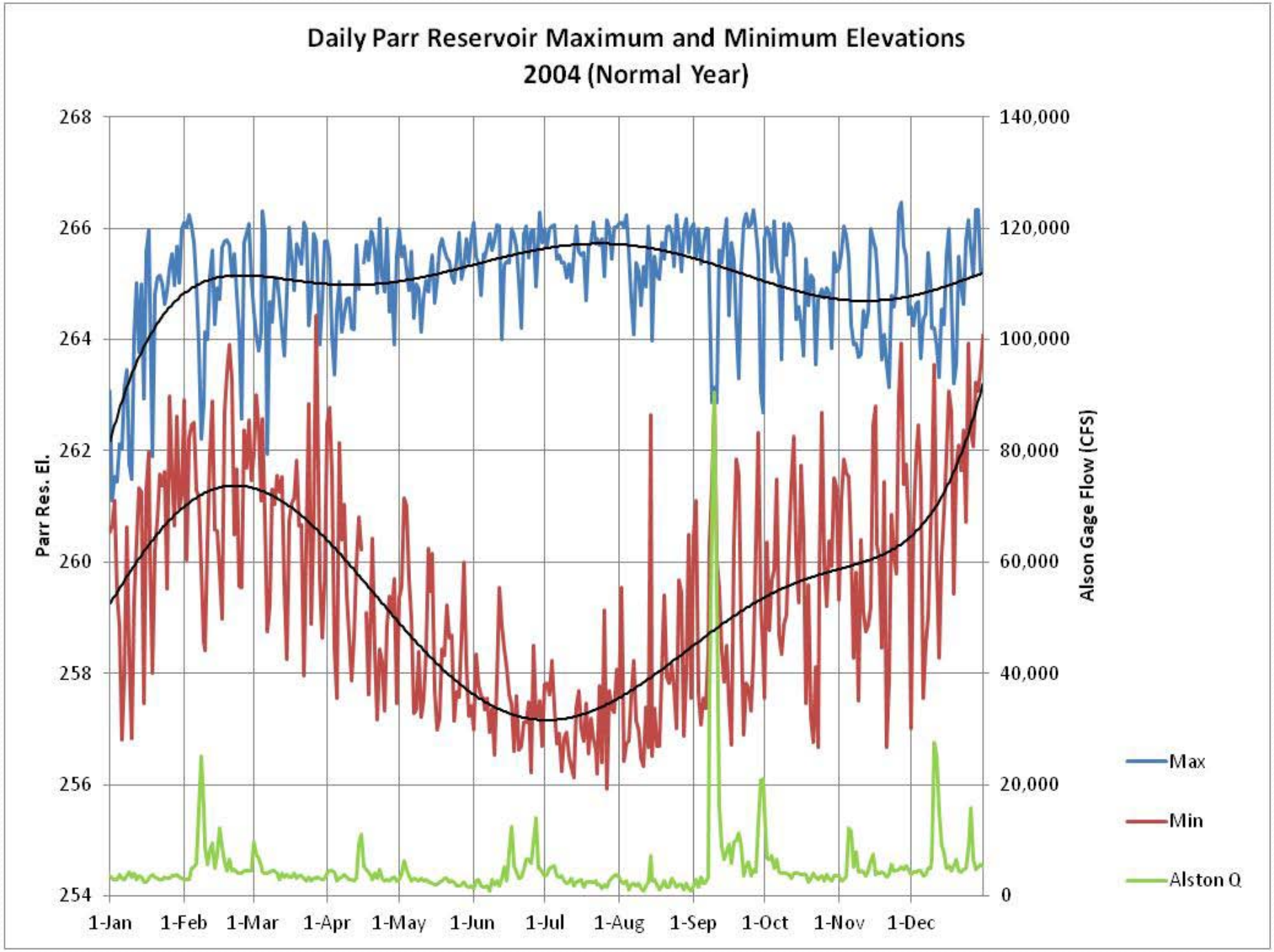
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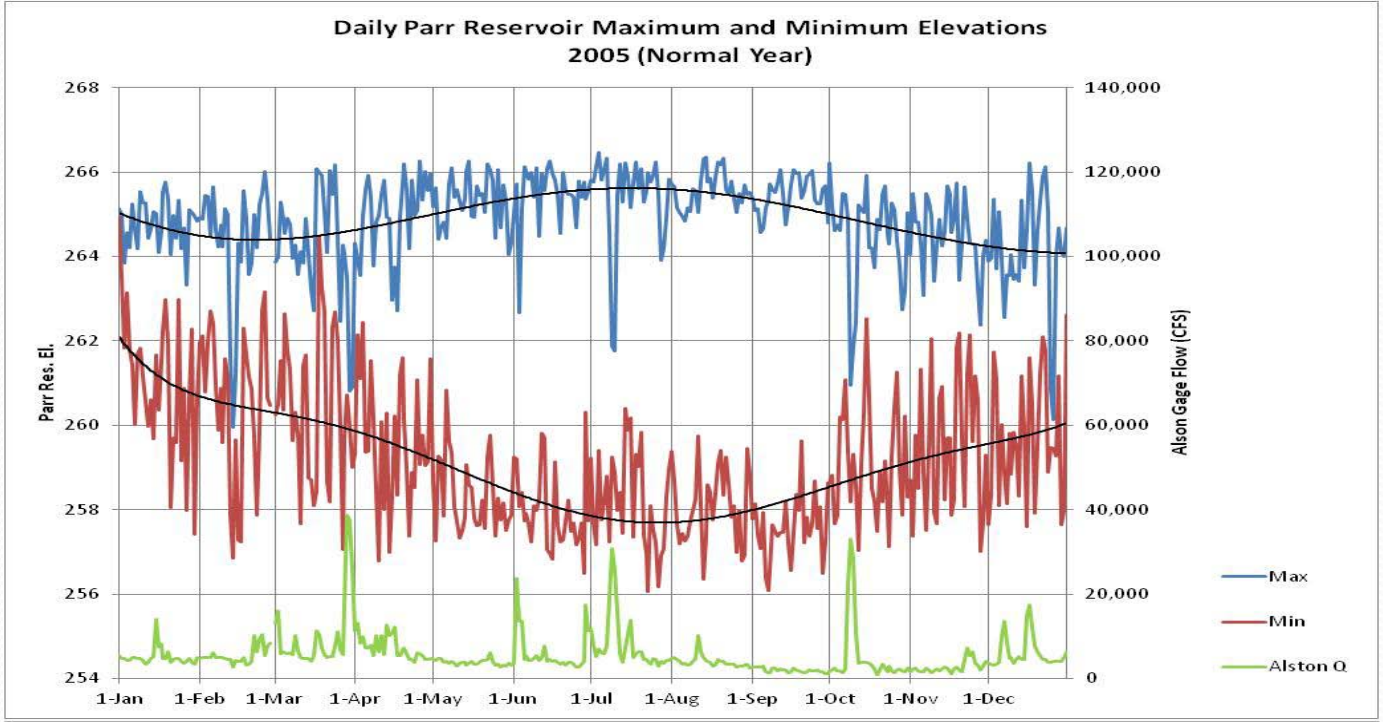
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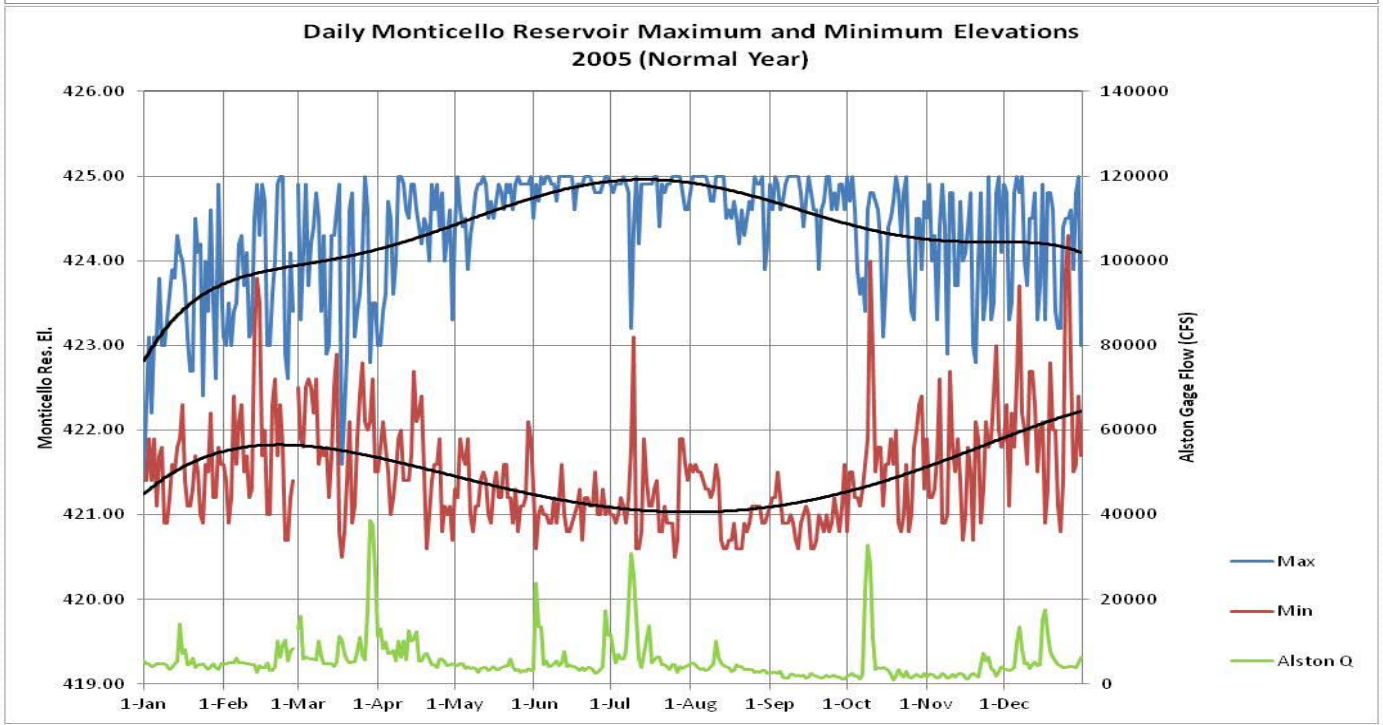
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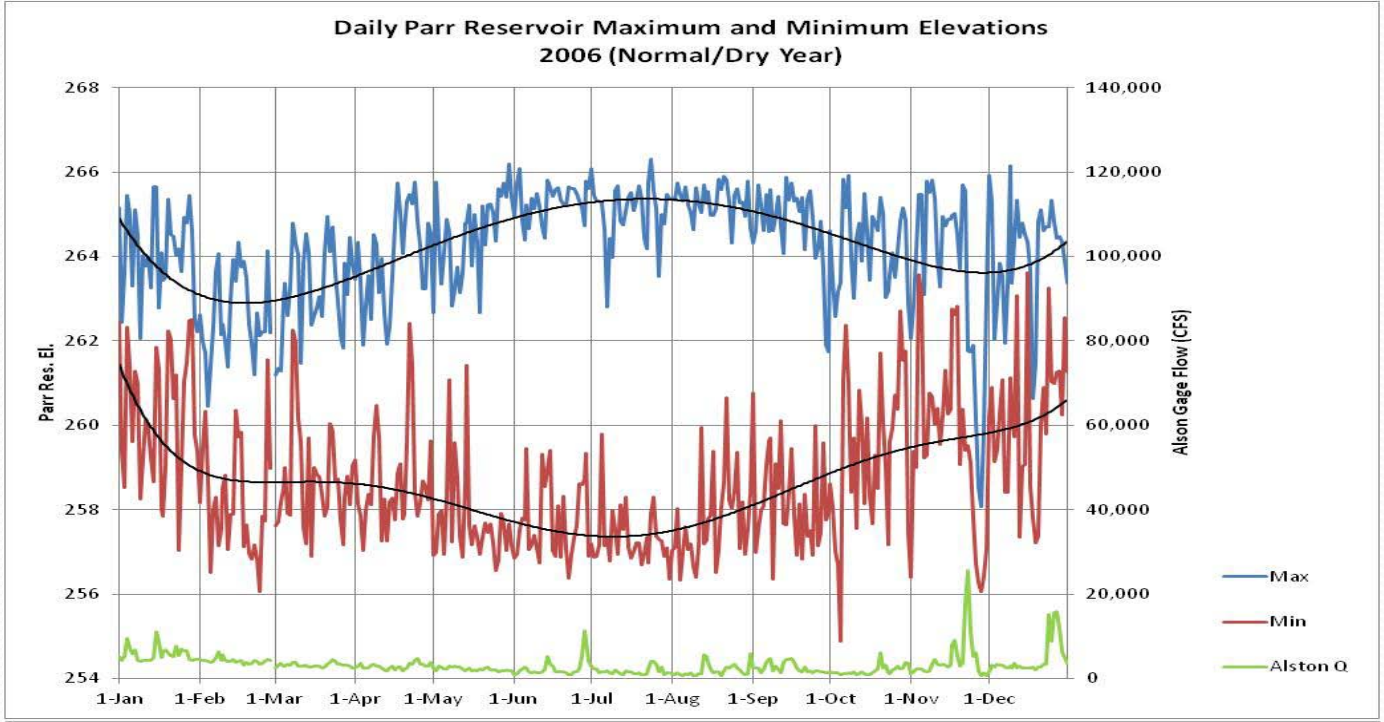
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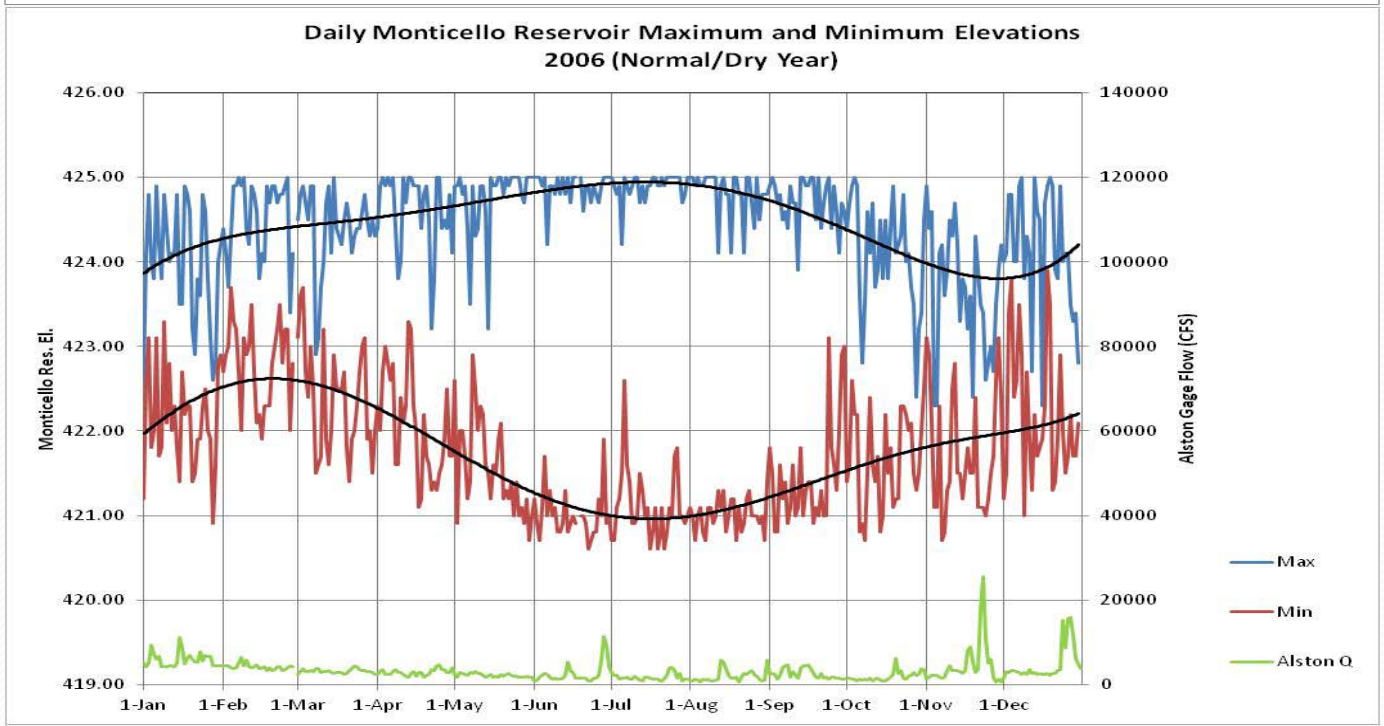
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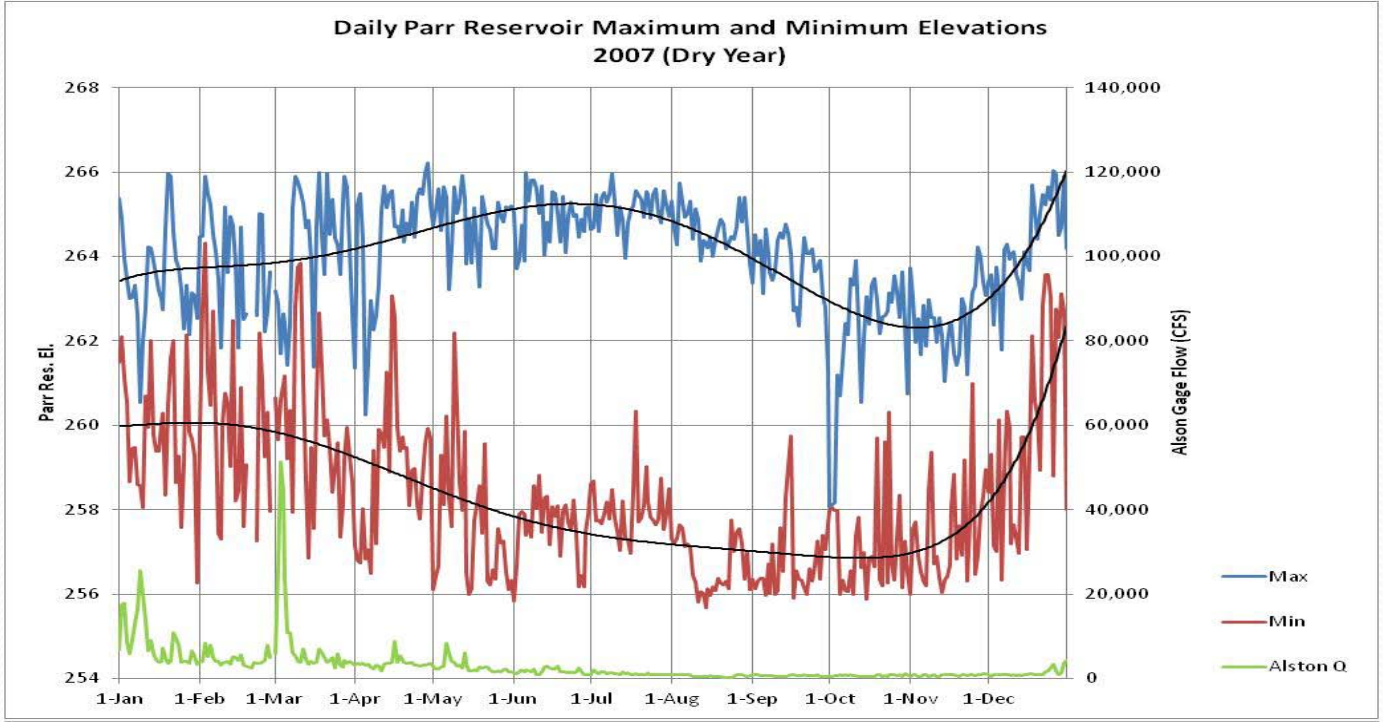
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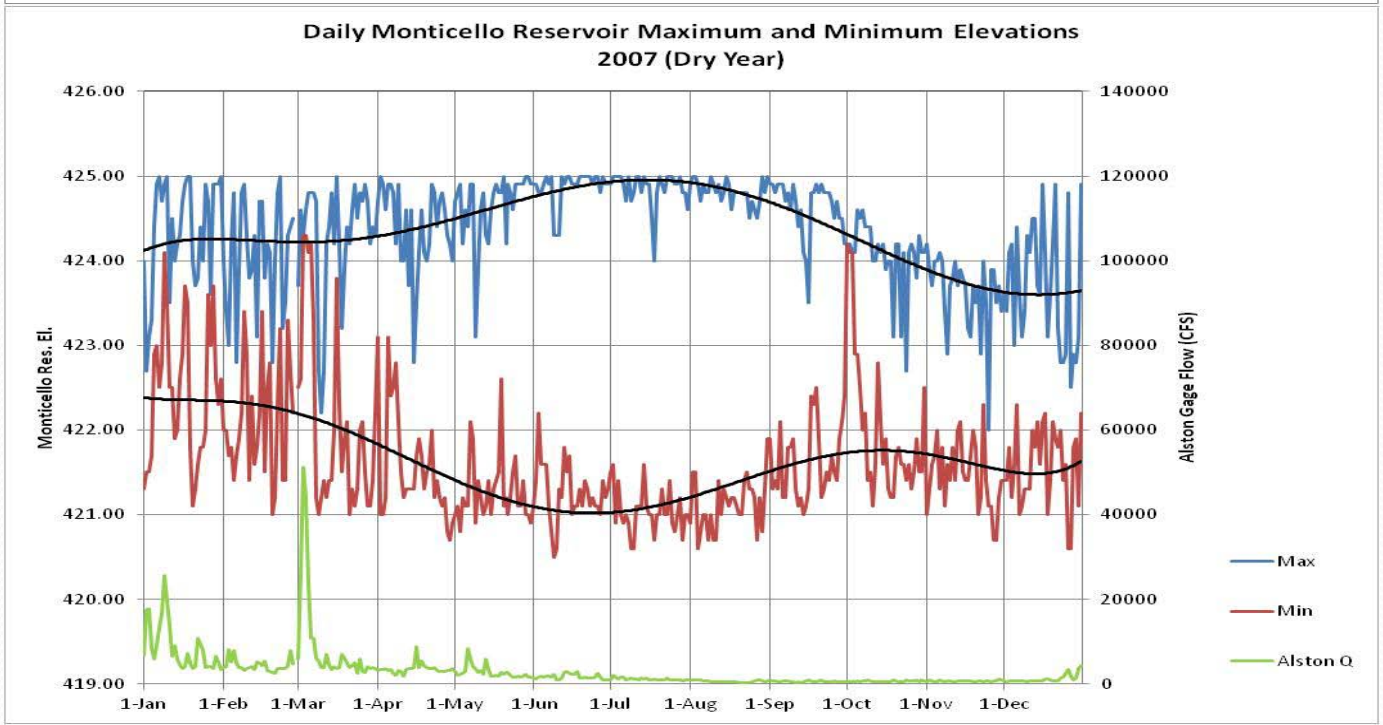
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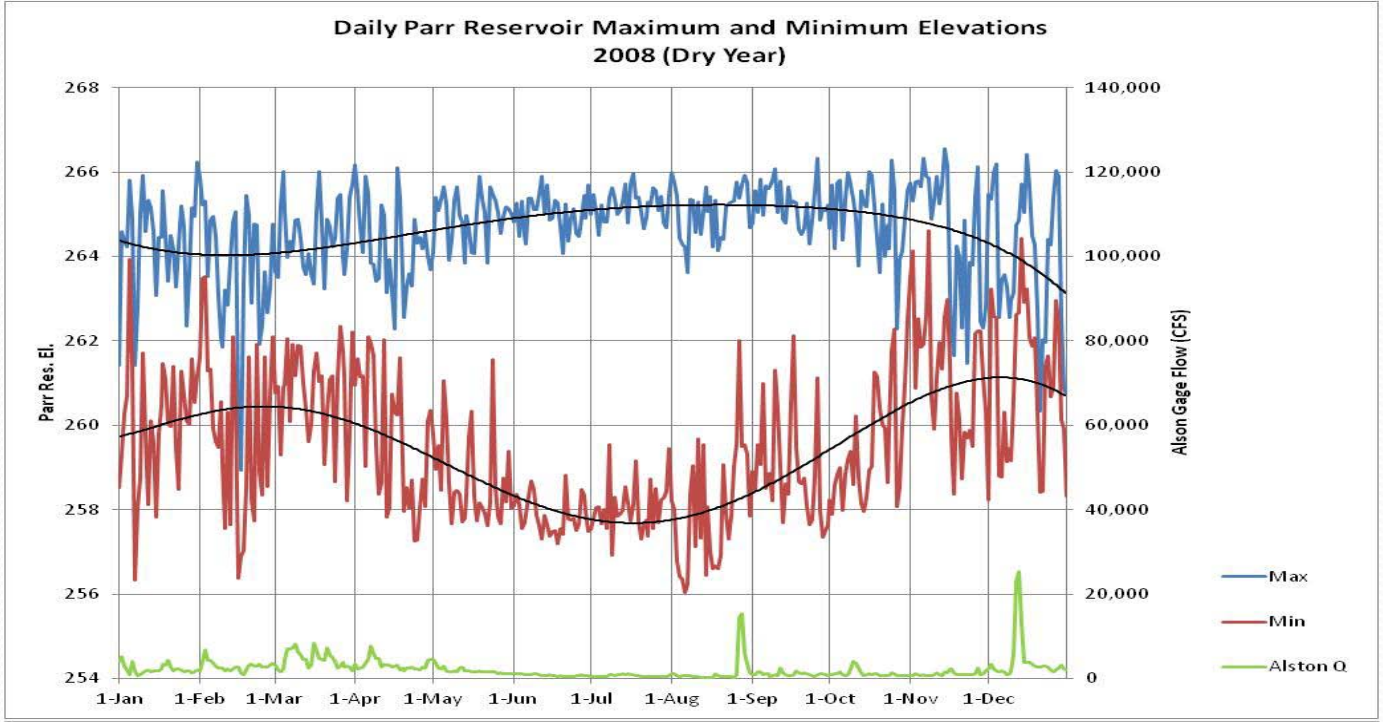
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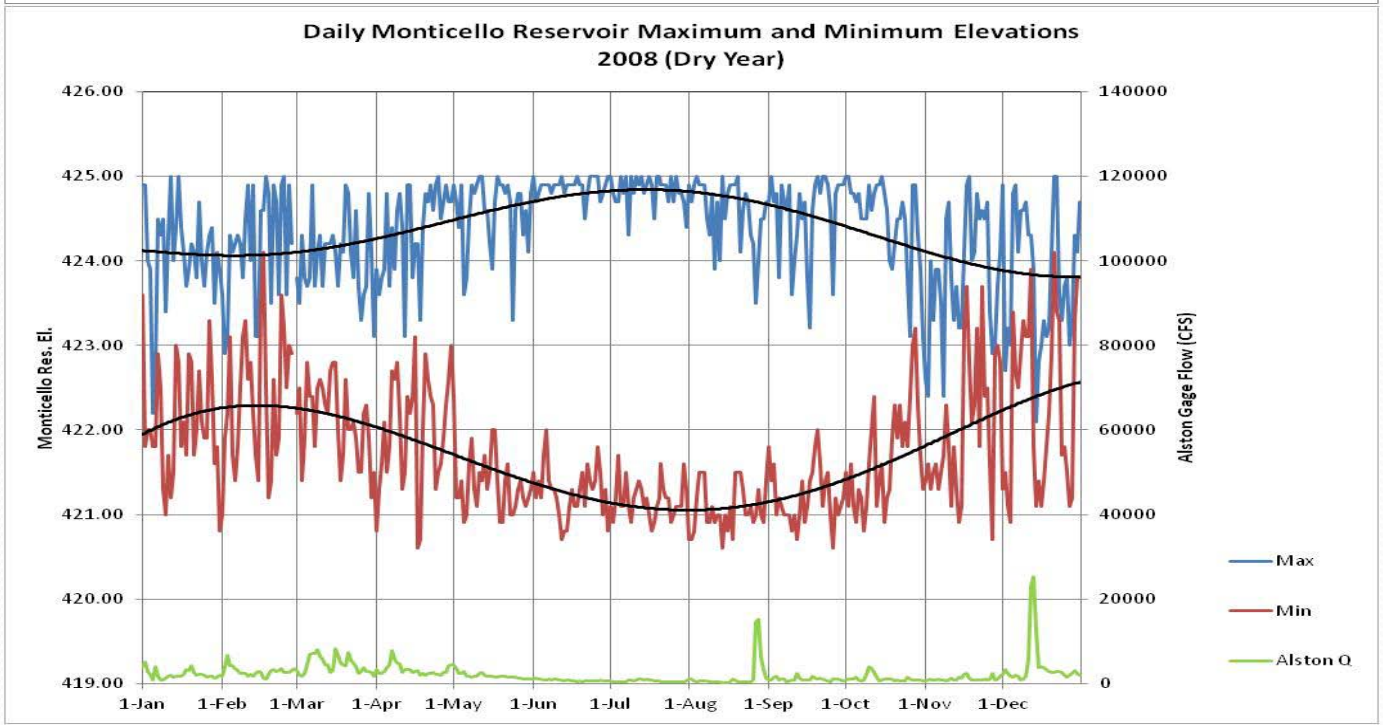
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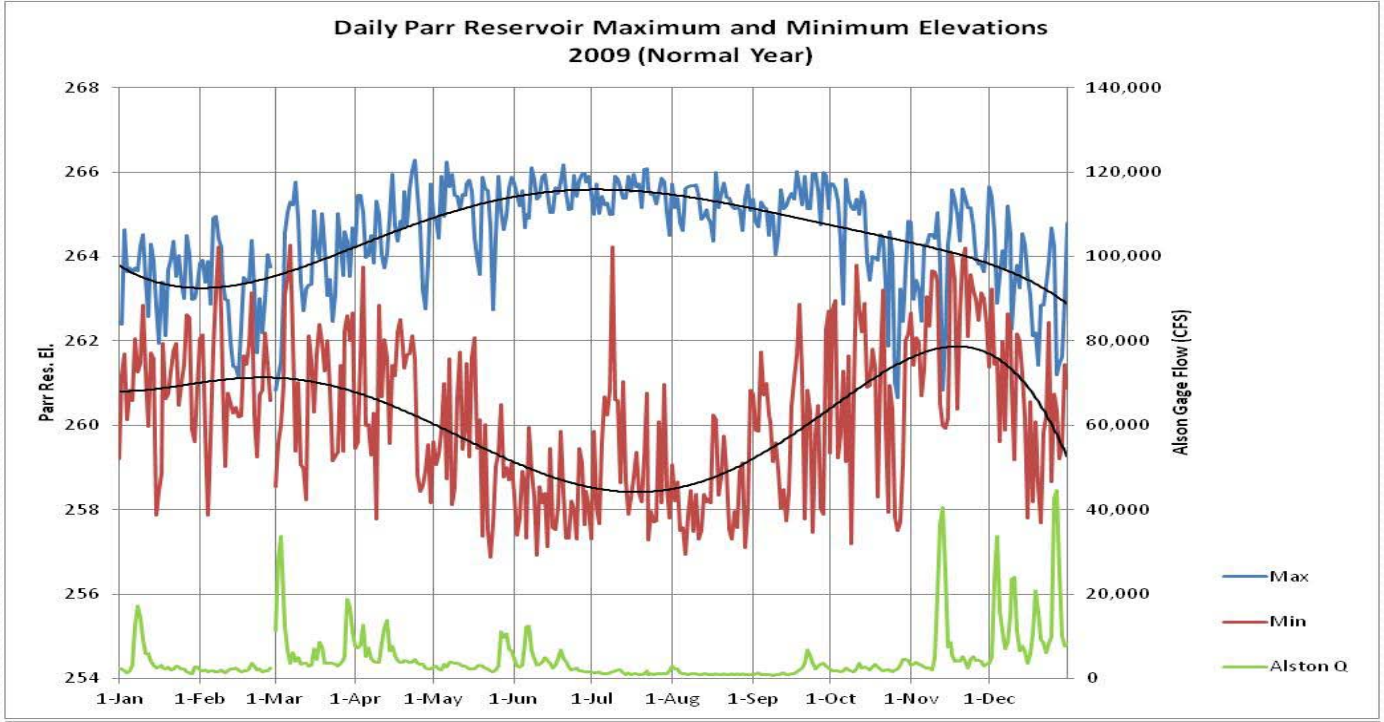
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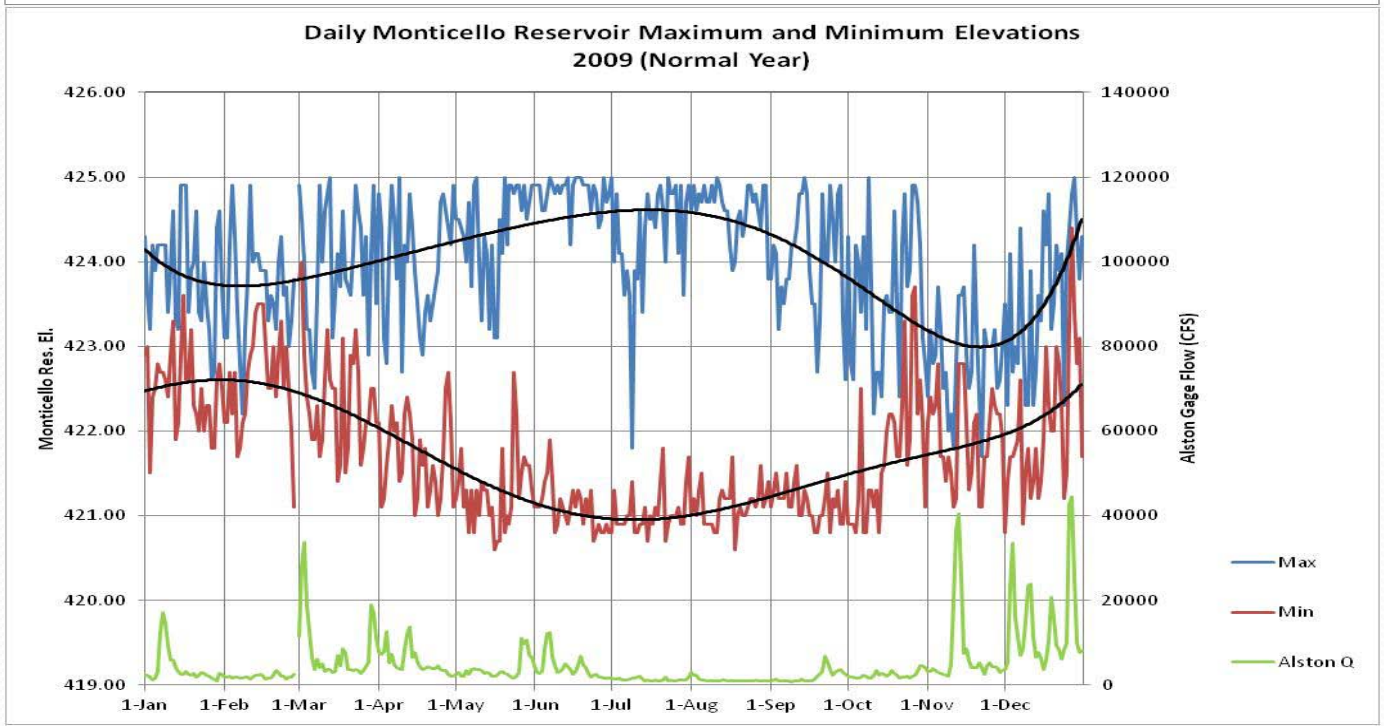
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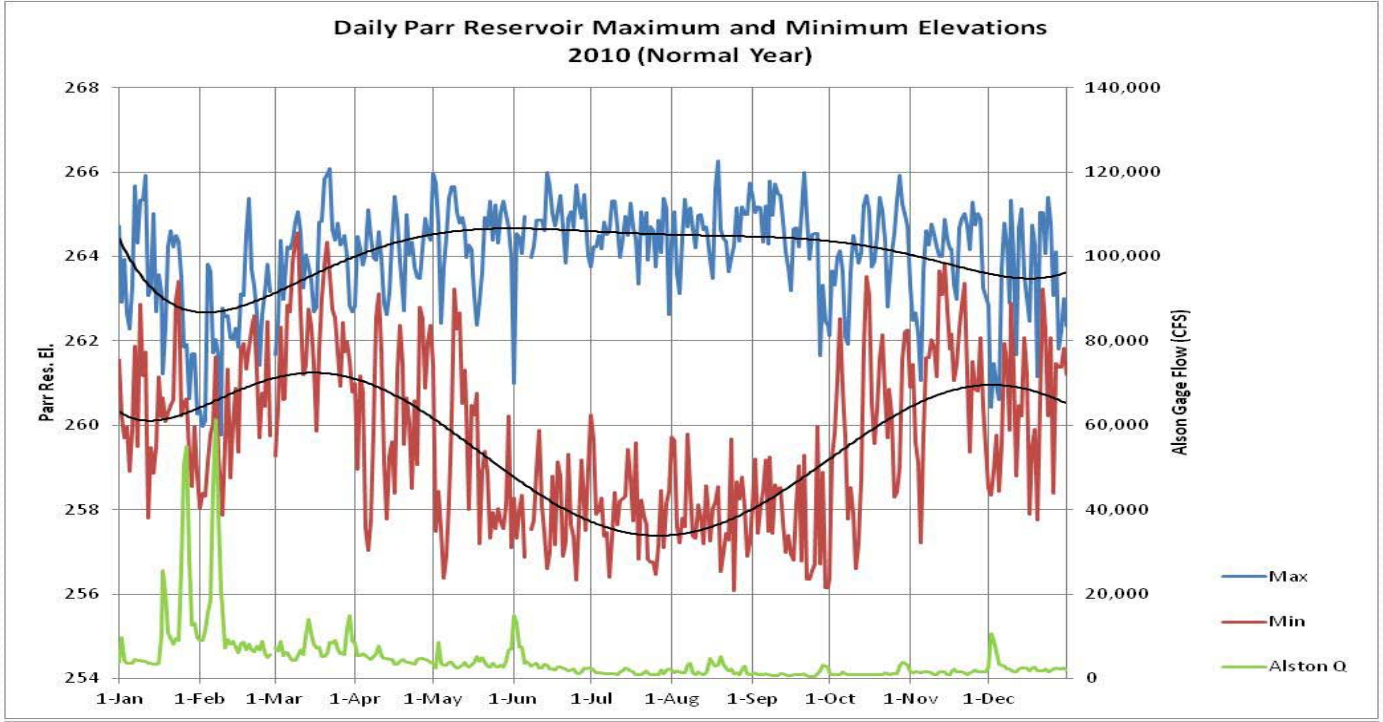
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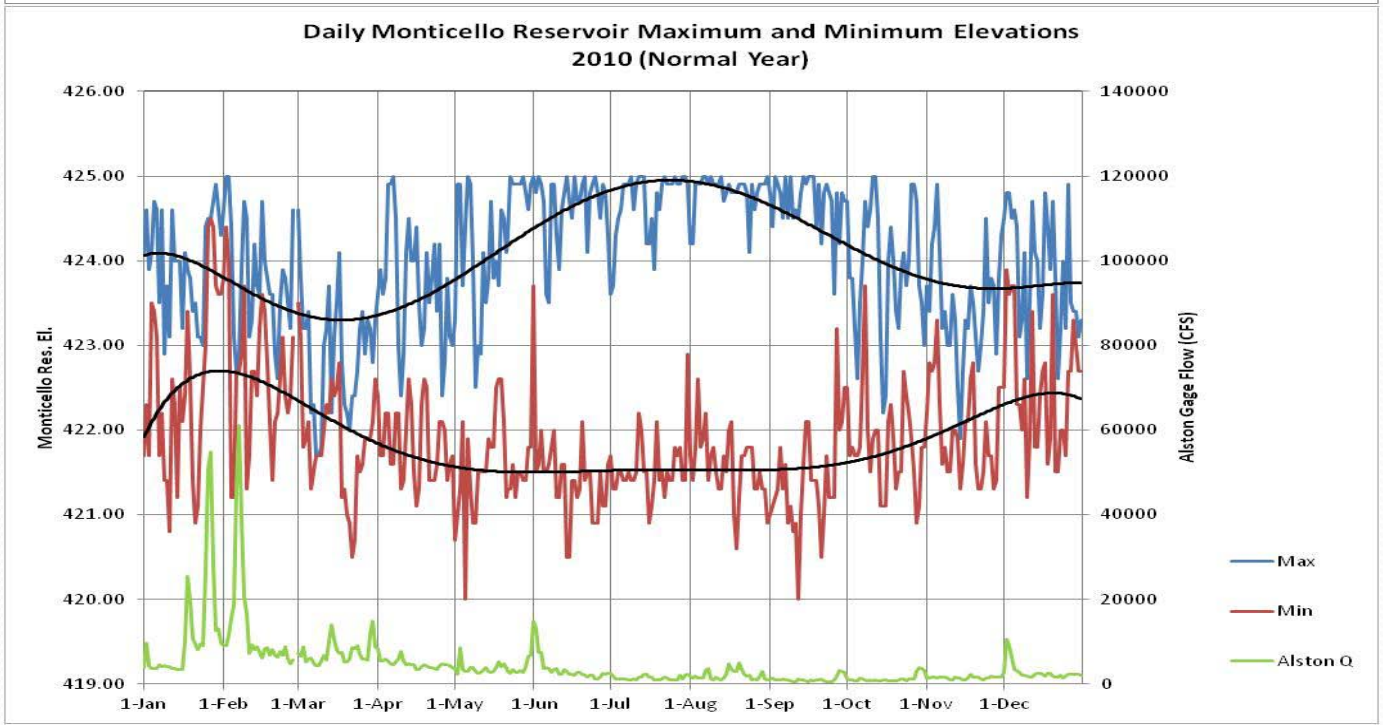
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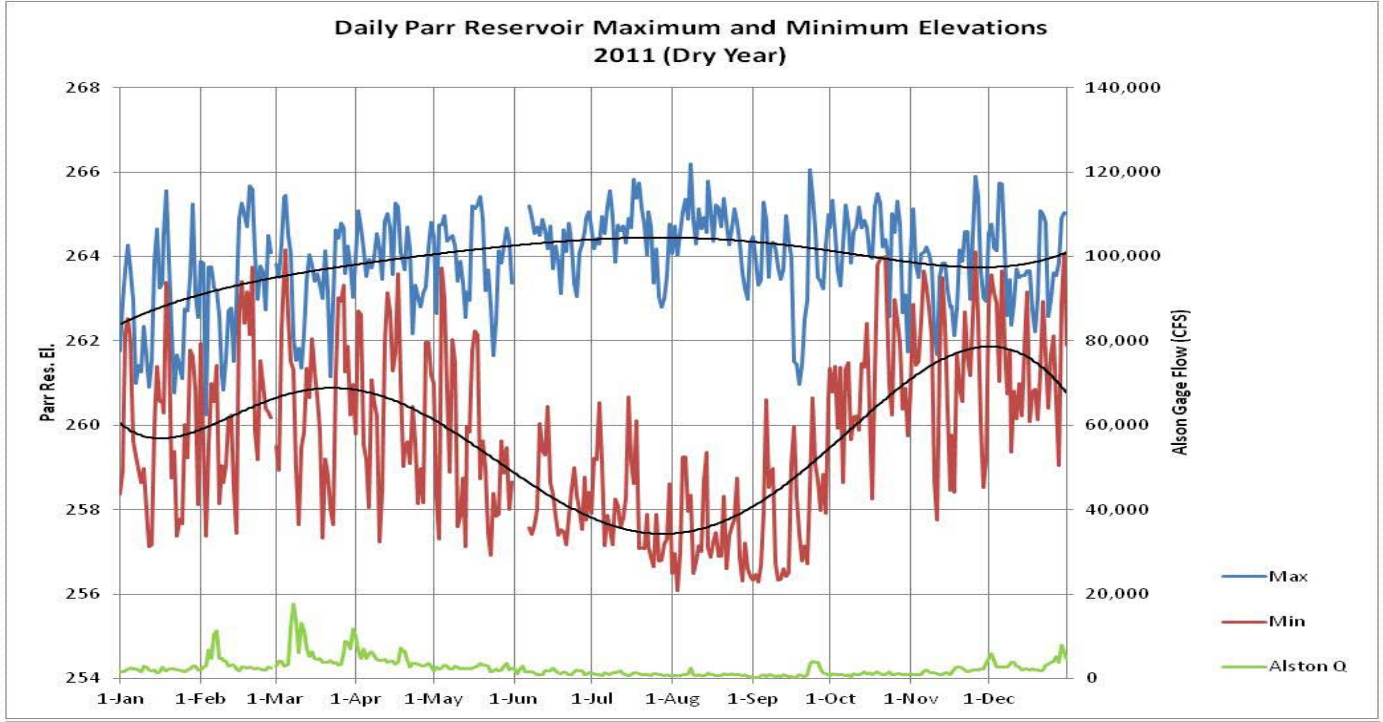
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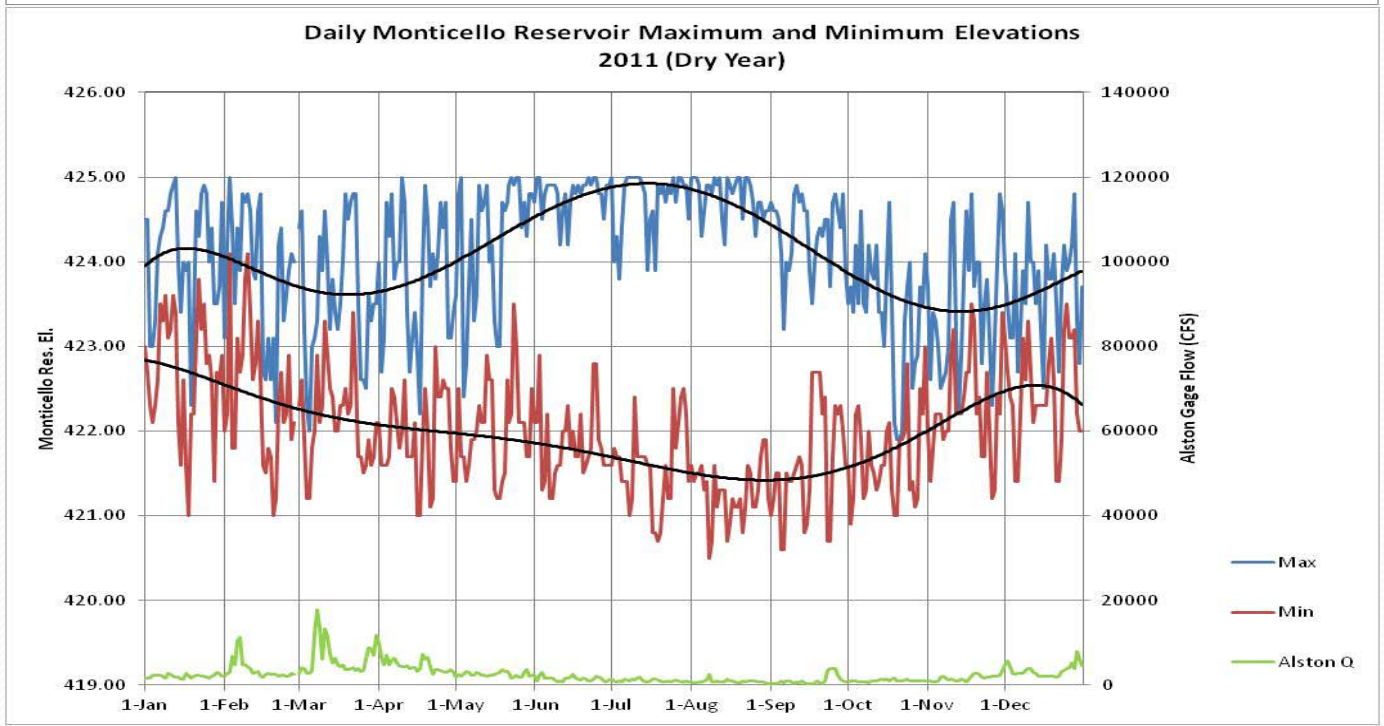
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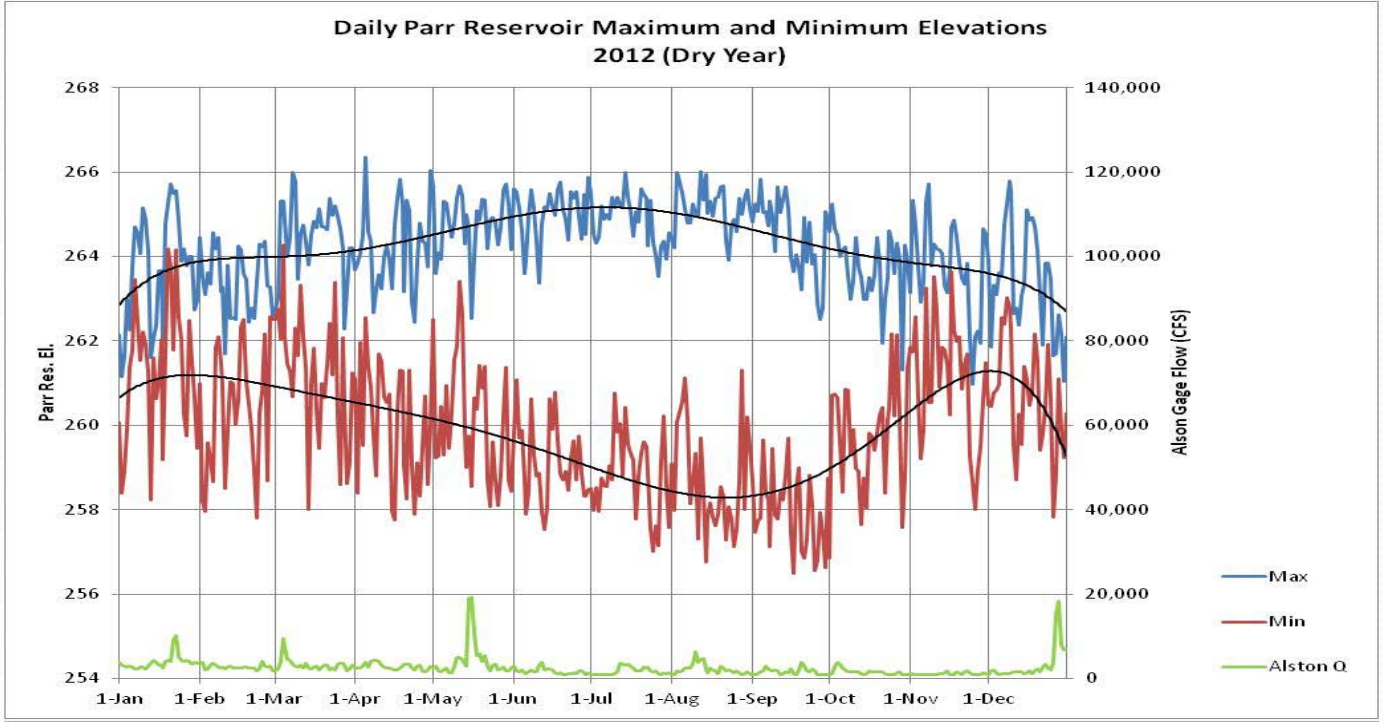
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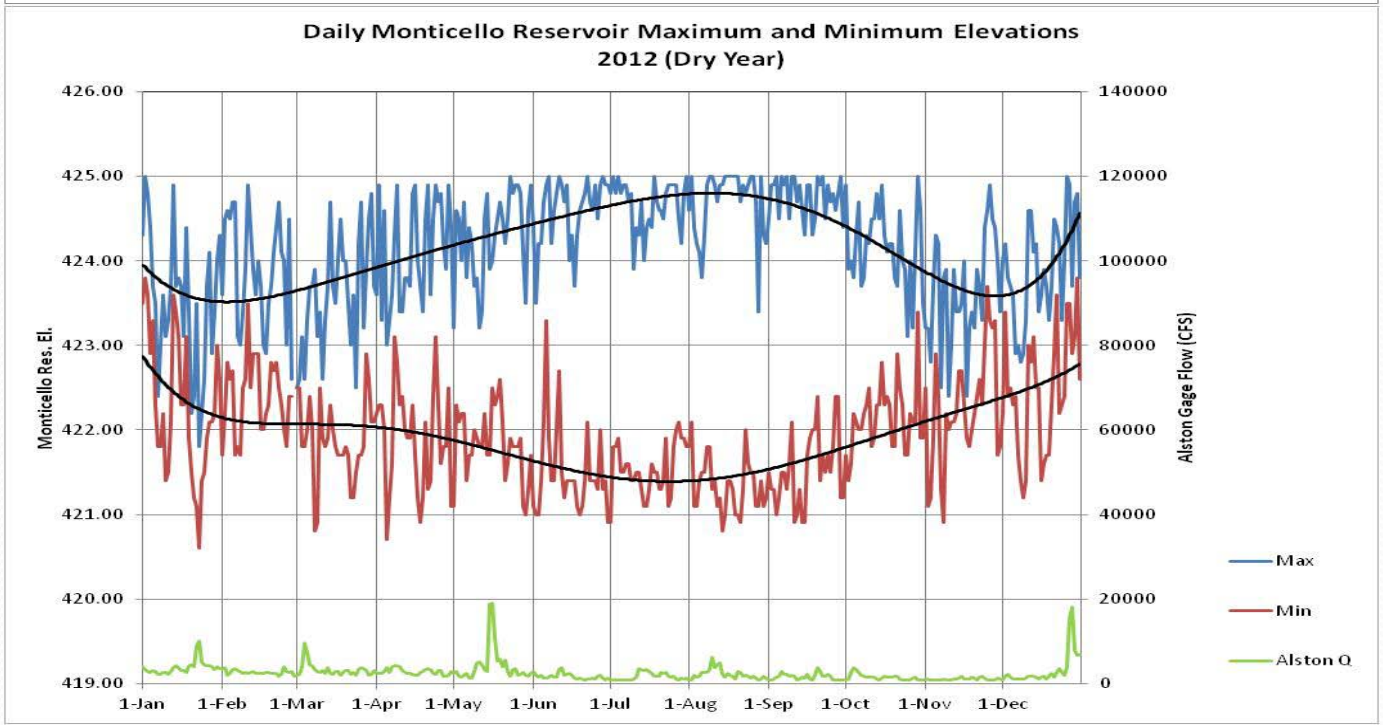
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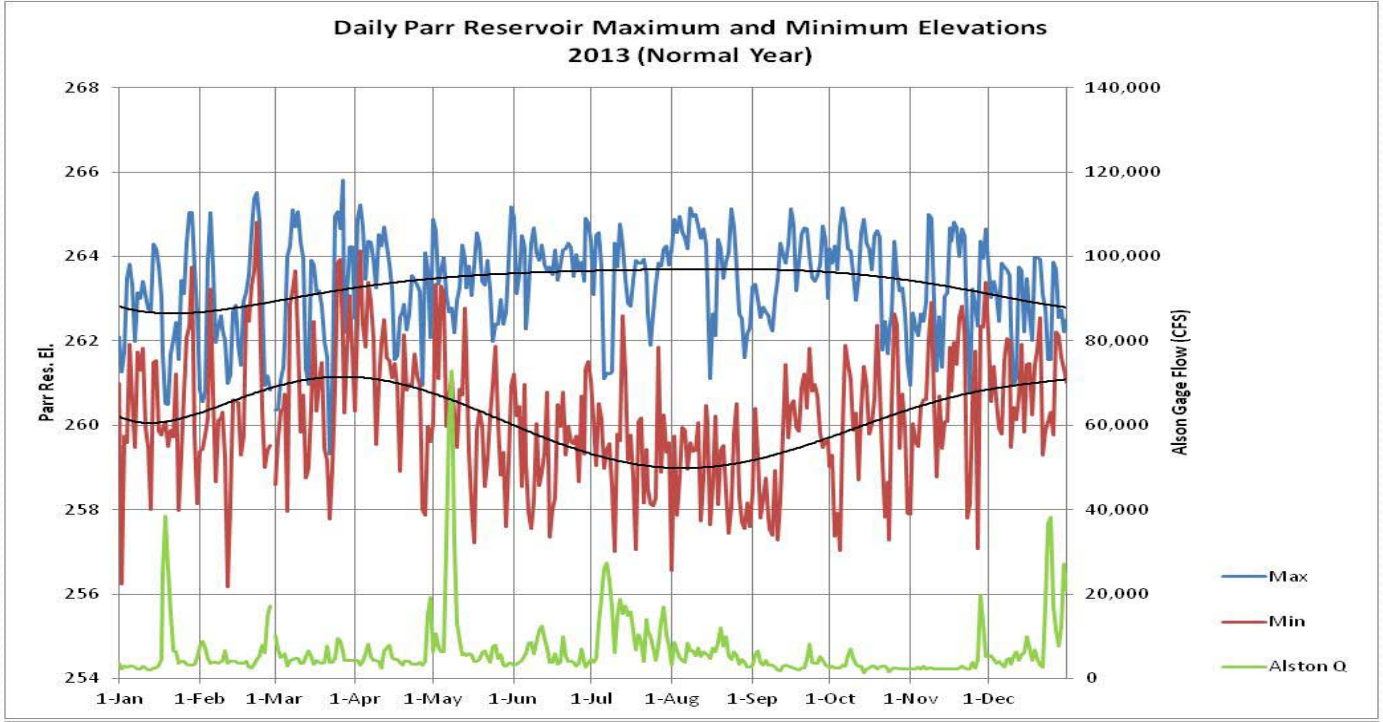
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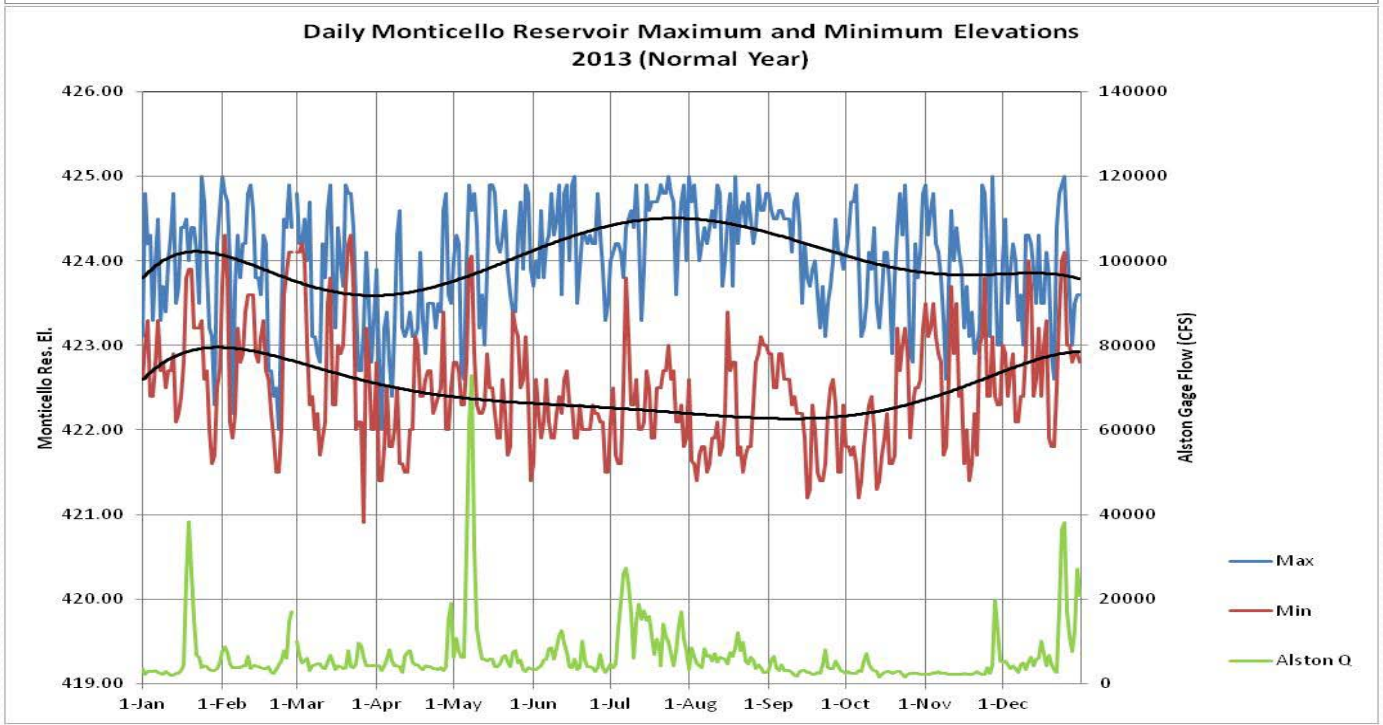
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Observations

- For both reservoirs, average annual fluctuation correlates closely with Fairfield generation and pumping MWHs, but not with flow at Alston gage site.
- Parr generation correlates closely with Alston flow.
- No obvious differences in pattern of fluctuation in wet vs. dry years.

DRAFT
RESERVOIR FLUCTUATION STUDY PLAN

PARR HYDROELECTRIC PROJECT
(FERC NO. 1894)

Prepared for:

South Carolina Electric & Gas Company
Cayce, South Carolina

Prepared by:

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtUSA.com

February 2014

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SOUTH CAROLINA ELECTRIC & GAS COMPANY

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SOUTH CAROLINA ELECTRIC & GAS COMPANY

1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) is the Licensee of the Parr Hydroelectric Project (FERC No. 1894) (Project). The Project consists of the Parr Hydro Development and the Fairfield Pumped Storage Development. Both developments are located along the Broad River in Fairfield and Newberry Counties, South Carolina.

The Project is currently involved in a relicensing process which involves cooperation and collaboration between SCE&G, as licensee, and a variety of stakeholders including state and federal resource agencies, state and local government, non-governmental organizations (NGO), and interested individuals. The collaboration and cooperation is essential to the identification and treatment of operational, economic, and environmental issues associated with a new operating license for the Project. SCE&G has established several Technical Working Committees (TWC's) with members from among the interested stakeholders with the objective of achieving consensus regarding the identification and proper treatment of these issues in the context of a new license.

- During issues scoping, the Fisheries TWC identified the potential need for a Reservoir Fluctuation Study on the Parr and Monticello Reservoirs. The operating regime for the Project consists of a lowering and a refilling of the Project's two reservoirs on a daily basis. Although the amount at which the Project reservoirs fluctuate varies based on load demands and system needs, Monticello Reservoir is currently permitted by the FERC license to fluctuate up to 4.5 feet, while Parr Reservoir is permitted to fluctuate up to 10 feet. The magnitude of daily fluctuations varies seasonally in both impoundments. The largest daily fluctuations generally occur in June, July and August in both reservoirs (insert tables from Argentieri presentation). During February through April, when many fish species are spawning in shallow water habitat, average daily fluctuations range from

1.6-2.4 feet in Lake Monticello and from 2.9-4.2 feet in Parr Reservoir (Argentieri presentation 12-19-13). Resource agencies and stakeholders have expressed concerns of how these daily and seasonal fluctuations are affecting aquatic habitat along the shorelines of the reservoirs.

2.0 EXISTING INFORMATION

Fisheries

The Project area supports warmwater fish communities typical of impounded river reaches in the Piedmont of South Carolina. Recent survey work within the Project area documented 30 species of fish occurring in Parr Reservoir and 24 species in Monticello Reservoir. Although some seasonal variations in community structure have been documented, the fish communities are generally similar between the two reservoirs, with gizzard shad, blue catfish, bluegill, channel catfish and white perch often being the dominant species (Normandeau 2007, 2008, 2009; SCANA 2013). Important game fish species such as largemouth bass, black crappie, and smallmouth bass (to a ~~lessor~~lesser extent) are also abundant in the two reservoirs. Life history and spawning preferences can influence the extent to which fish species are affected by reservoir fluctuations. Habitat and spawning preferences of the dominant fish species are briefly considered below.

Comment [WU1]: add table(s) of fish species for each reservoir

Comment [WU2]: - this section focuses on the effects of pool level fluctuations on the "dominant" fish species. Please include other fish species such as largemouth bass, bluegill, redear sunfish, redbreast sunfish, and black and white crappie.

Gizzard shad are a pelagic species that generally occupy the limnetic zone as well as feed along the littoral zone. Spawning typically occurs in the spring, associated with rapidly rising water levels. Gizzard shad typically spawn in shallow waters, 5 feet deep or less, and prefer recently inundated habitats, when available (Williams and Nelson, 1985). Blue and channel catfish typically occupy deep, protected areas, spawning at sites 6.5 to 13 ft deep (McMahon and Terrell, 1982). Bluegill typically inhabit and spawn within shallow, back-water habitats, at depths of 1-3 meters (Stuber et. al., 1982). White perch also spawn in relatively shallow habitat within reservoirs (0-5 feet). Adult white perch exhibit seasonal movements, utilizing both shallow and deep water habitat (Stanley and Danie, 1983). *Comment: Add language for largemouth bass, smallmouth bass and black crappie*

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Small fishes, such as shiners, juvenile sunfish~~minnows~~, and small suckers serve as the food base for larger, piscivorous species. In general, these species typically have high fecundity rates and

will utilize a variety of habitat types for spawning, cover, and resting. These species are typically ~~generalists; however, all of these species are generally~~ found within or in the vicinity of aquatic vegetation or other cover. When inundated, the shallow areas may be frequented by these species for forage and cover.

Pool Elevations

During the construction of Monticello Reservoir and the Fairfield Development in 1974, crest gates were added to Parr Shoals Dam, allowing for a full operating range of 266 ft to 256 ft at Parr Reservoir. Monticello Reservoir was constructed to allow for a full operating range of 425 ft to 420.5 ft.

SCE&G submitted surface area and capacity curves as part of the Final Environmental Impact Statement for Parr Hydroelectric Project, conducted in March 1974, after the crest gates were added to Parr Shoals Dam. In Monticello Reservoir, a change in elevation from 425 feet to 420.5 feet will reduce the surface area of the reservoir from 6,800 acres to 6,467 acres (95% of full pool surface area), resulting in a difference of 333 acres of shoreline exposed. The exposed shoreline is generally included in a narrow band that extends around the reservoir. A change in elevation on Parr reservoir from 266 ft to 256 ft will reduce the surface area of the reservoir from 4,369 acres to 1,375 acres (31.5% of the ~~normal~~ full pool surface area), resulting in a difference of 2,994 acres of exposed lake bottom~~shoreline~~. Prior to the construction of the crest gates and reservoir expansion, the approximately 3,000 acres was not inundated or available as aquatic habitat in Parr Reservoir.

3.0 STUDY OBJECTIVES

The primary objective of this study is to provide a qualitative assessment of the potential effects of operational reservoir fluctuations on aquatic habitat and navigation within the Project Area. As noted in Section 2.0, areas of shoreline are exposed during impoundment fluctuations, but the type and quality (mud flats, shoals, vegetated littoral zones? *(Comment: development of vegetated littoral zones is incumbent on stable pool elevations, therefore this measurement will surely be very low and not representative of project resources without pool fluctuations.* ~~*What would be more valuable is to use a reference lake such as the sub-impoundment to determine project impacts, although using the sub-impoundment might be problematic because it was recently stocked with grass carp)*~~, etc.) of those areas are currently unknown. This study will provide information to characterize habitats within areas exposed during lake-level fluctuations and identify areas with potential navigation issues caused by fluctuations. A secondary objective of this study is to identify appropriate Protection, Mitigation and Enhancement (PM&E)

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measures that might offset potential effects of daily fluctuations which could be considered as part of the Final License Application.

4.0 GEOGRAPHIC AND TEMPORAL SCOPE

The study will focus on Parr and Monticello Reservoirs during maximum normal pool and minimum normal pool. Several transects will be established at representative locations along Parr and Monticello Reservoirs, where information such as slope and elevation will be gathered. Members of the Fisheries TWC will select these transect locations prior to the study being performed, which will be no later than the summer of 2015. The study will commence after transect locations are selected.

After fluctuation data is collected and analyzed, the TWC will meet to discuss potential PM&E measures that could be considered for each reservoir.

5.0 METHODOLOGY

The study area will include both Parr and Monticello reservoirs. ~~(*Comment: Need a transect in the sub-impoundment as a control for determining potential habitat without fluctuation. Lake Murray could be another option.)*~~ A maximum of four Priority Areas will be identified in Parr Reservoir by the Fisheries TWC members. Potential Priority Areas in Parr Reservoir have been identified and are depicted in Figure 1~~Figure 1~~ and Figure 2~~Figure 2~~. These Priority Areas will be representative locations within the reservoir that will best depict a variety of aquatic habitat types. Within each Priority Area, 3 to 5 transects will be identified across the wetted area. At each transect, elevations will be collected at full pool via GPS (GeoExplorer 6000 paired with an external Zephyr antenna) or survey methods, as well as at 1 foot increments as the reservoir level is lowered during a fluctuation cycle. Surveys will be performed during a low inflow and high energy demand period (August/September) so that as much of the full operating range of 10 ft as possible, from 266 ft to 256 ft can be observed. From this information an estimate of how much ~~bank~~ reservoir area is dewatered at each 1 foot contour will be estimated. At or near the minimum normal pool elevation (256 ft), slope and habitat type will also be photographed. Prior to the field study, locations that may present potential navigation issues during low fluctuations in Parr Reservoir will be identified (or included as a Priority Area). While aquatic habitat information is being collected in Parr Reservoir, field workers will also examine these areas

during a fluctuation cycle. Any areas that appear to have navigation issues will be documented and photographed.

FIGURE 1 POTENTIAL PRIORITY AREAS IN UPPER PORTION OF PARR RESERVOIR

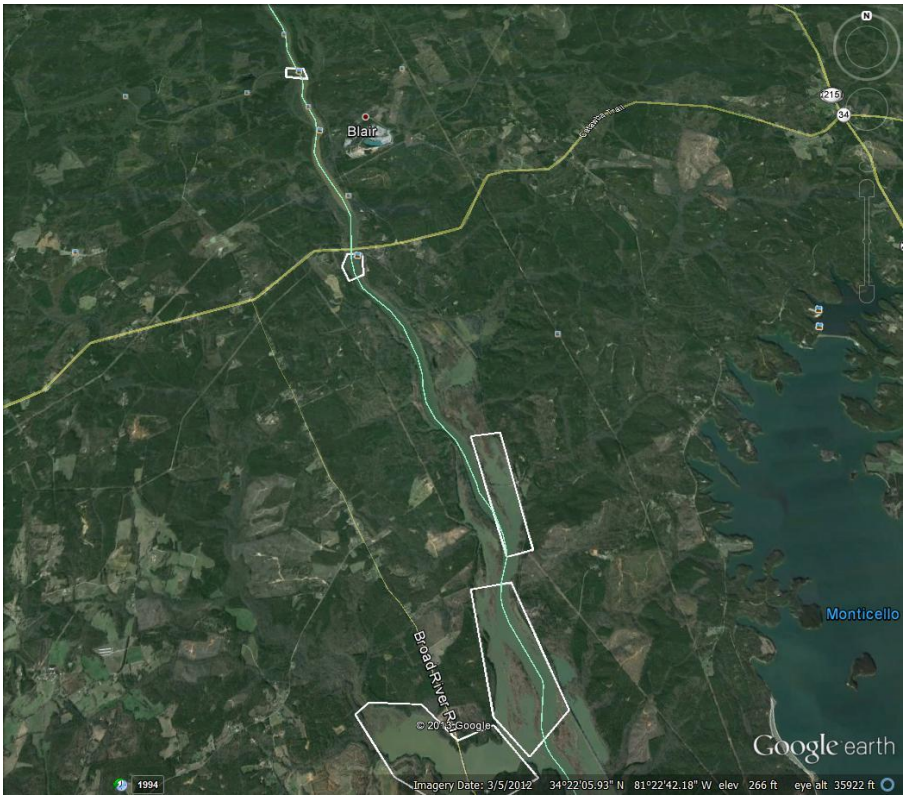

FIGURE 2 POTENTIAL PRIORITY AREAS IN LOWER PORTION OF PARR RESERVOIR

In Monticello Reservoir, a minimum of two Priority Areas will be identified that represent potential critical aquatic habitat areas. At each of these locations slope and habitat type will be measured and photographed at each 1 ft increment from 425 ft to approximately 420.5 ft.

The collected data will be consolidated into a report for the Fisheries TWC review and comment. This report will be the basis for the Fisheries TWC to determine potential PM&E measures that could be implemented at each reservoir. Typical PM&E measures may include aquatic habitat enhancements that could enhance fish spawning and/or recruitment.

6.0 SCHEDULE

Selection of Priority Areas will be completed no later than July of 2015. Field collections will be completed no later than the fall of 2015. After field data collection have been summarized in a report and distributed for review, the Fisheries TWC will meet to discuss PM&E measures that are appropriate for each reservoir. A final report summarizing the study findings and potential PM&E measures that could be considered as part of the Final License Application will be issued in or around July 2016. Study methodology, timing and duration may be adjusted based on weather and consultation with resource agencies and interested stakeholders.

7.0 USE OF STUDY RESULTS

Study results will be used as an information resource during discussion of relicensing issues and developing potential Protection, Mitigation and Enhancement measures with the South Carolina Department of Natural Resources, USFWS, Fisheries TWC, and other relicensing stakeholders.

8.0 REFERENCES

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