Portland Prepares for La Niña: What Winter Could Bring 2024-2025

By April Richelle Elliott

Image Credit: city-snow-xxl-picture-id173592608 (612×408) (istockphoto.com)

Winter Weather Forecast Review for 2023-2024

“Grades” for last years forecast

(Shout out to Tanis Leach. He technically stated the “report card”)

A = Green

B = Green/Yellow

C = Yellow

D = Orange

F = Red

Winter Weather Forecast Review for 2023-2024

Forecast: Significant Weather Events:

- High Wind Event
  - Likely in the November/December time frame (can't rule out a late season event, but less likely).
- Heavy Rain/Flooding Event
  - November/December.
- Possible Cold Snap
  - December/possibly early January.

Outcome: Significant Weather Events:

- **High Wind Event**
  - Timing was off. I did say that we can't rule out a late season event but said it would be less likely.
    - High Wind Event 1/13/2024 (accompanied with snow and ice):
      - Gusts at 40-55 mph (isolated gusts of 60-70 mph).
      - Toppled over 675 trees and knocked down powerlines (leaving thousands without power).
- **Heavy Rain/Flooding Event**
  - This was an accurate forecast because we did see a heavy rain/flooding event in December.
    - We saw an atmospheric river 12/5/23-12/6/23:
      - PDX totals for 12/5/23: 1.48".
      - PDX totals for 12/6/23: 1.68".
      - There were reports of localized flooding and road closures in the PDX metro area.
      - A landslide halted Amtrack between Portland and Seattle.
- **Possible Cold Snap**
  - Timing was bit off. I said we would see a cold snap possibly early January.
    - Cold snap 1/13/24-1/16/24:
      - PDX high 1/13/24: 21°F.
      - PDX high 1/14/24: 23°F.
      - PDX high 1/15/24: 30°F.
      - PDX high 1/16/24: 27°F.
      - This was accompanied with high winds, ice, and snow.

Winter Weather Forecast Review for 2023-2024

Forecast: Snow/Ice:

- A snow event is possible, but not guaranteed. If we do see a snow event, it will likely occur between December and early January, with a higher probability of such event during the late December to January time frame.
    - I am forecasting seasonal totals to range of 0”-6”.
    - An ice event (or even two) is also possible, notably on the east side, especially if we get some good easterlies through the Columbia River Gorge.
        - If we do see an ice event, it would most likely late December/early January.

Outcome: Snow/Ice

- **Snow:**
    - Seasonal snow total: 1.6” (one event 1/13/24).
        - I could have been tighter in my spread, hence why did not give myself an “A”.
        - We did see snow technically in early January (1/13/24). However, to really get a “A” on this, I should have said mid-January. Due to this, I gave myself a B.
- **Ice Event:**
    - We did see an Ice Event 1/13/24-1/14/24.
        - Technically this was early January, however, to earn a true A, I should have forecasted mid-January.
        - This ice event did have more of an impact on the east side of Portland due to strong easterlies through the Gorge.

Forecast Review for 2023-2024 Summary

- **High Wind Event**
  - Timing was off. I did say that we can't rule out a late season event but said it would be less likely.
    - High Wind Event 1/13/2024 (accompanied with snow and ice).
- **Heavy Rain/Flooding Event**
  - This was an accurate forecast because we did see a heavy rain/flooding event in December.
    - We saw an atmospheric river 12/5/23-12/6/23.
- **Possible Cold Snap**
  - Timing was bit off. I said we would see a cold snap possibly early January.
    - Cold snap 1/13/24-1/16/24.
- **Snow:**
  - Timing was a bit off. I stated December and early January (honing in on the late December to early January time frame).
    - We saw one event, that resulted in 1.6" on 1/13/24. That was our seasonal total.
- **Ice Event:**
  - Timing was a bit off. I said we would likely see an ice event late December/early January. In addition, I did forecast that if we did see an ice event it would notably impact the east side, especially if we get some good easterlies through the Columbia River Gorge.
  - We did see an Ice Event 1/13/24-1/14/24 (to be more accurate, I should have said mid-January).
    - This ice event did have more of an impact on the east side of Portland due to strong easterlies through the Gorge.

My grade for my 2023-2024 forecast: B

On to the Future: Winter 2024-2025 at PDX

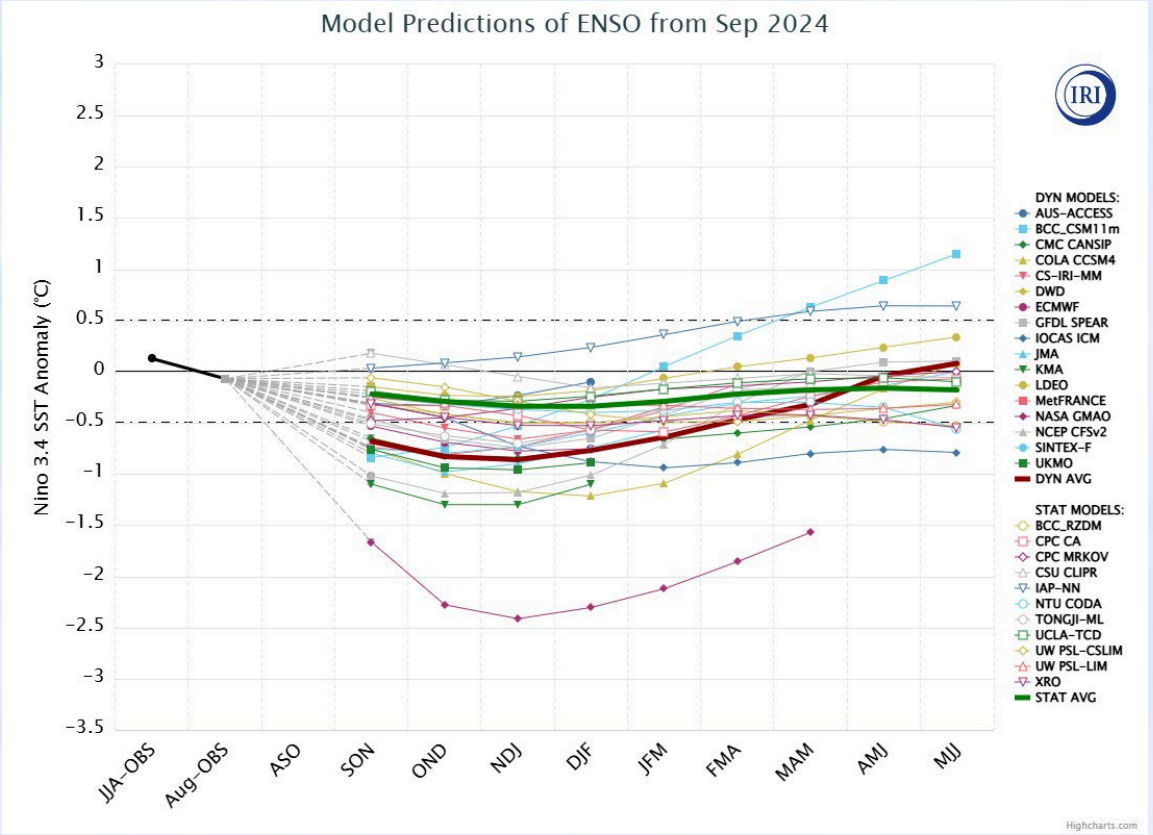
Original Image Source: c452dc70ad49a3ec9c54ab08ad64caad.png (1334×750) (pinimg.com)

ENSO Winter Outlook for 2024-2024

A weak La Niña is projected October-January, becoming ENSO Neutral February-April.

Model	OND	NDJ	DJF	JFM	FMA
Average Dynamical models	-0.834 °C	-0.862 °C	-0.770 °C	-0.640 °C	-0.467 °C
Average Statistical models	-0.289°C	-0.336 °C	-0.339 °C	-0.286 °C	-0.218 °C
Average All models	**-0.620 °C**	**-0.656 °C**	**-0.601 °C**	**-0.478 °C**	**-0.336 °C**

International Research Institute for Climate and Society. 2024. ENSO Sea Surface Temperature Table. Columbia University. https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-sst_table. Accessed 13 Oct. 2024



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Weak La Niña Winter Seasons Since 1950

Winter Season	OND	NDJ	DJF	JFM	FMA
***1950-1951**	-0.6°C	**-0.8°C**	**-0.8°C**	**-0.5°C**	-0.2°C
1954-1955	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.6°C**	-0.7°C
1962-1963	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.7°C**	-0.5°C
***1964-1965**	-0.8°C	**-0.8°C**	**-0.6°C**	**-0.3°C**	-0.1°C
***1971-1972**	-1.0°C	**-0.9°C**	**-0.7°C**	**-0.4°C**	-0.1°C
1974-1975	-0.8°C	**-0.6°C**	**-0.5°C**	**-0.6°C**	-0.7°C
***1983-1984**	-1.0°C	**-0.9°C**	**-0.6°C**	**-0.4°C**	-0.3°C
***1995-1996**	-1.0°C	**-1.0°C**	**-0.9°C**	**-0.8°C**	-0.6°C
***1996-1997**	-0.4°C	**-0.5°C**	**-0.5°C**	**-0.4°C**	-0.1°C
***2000-2001**	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.5°C**	-0.4°C
2005-2006	-0.6°C	**-0.8°C**	**-0.9°C**	**-0.8°C**	-0.6°C
2008-2009	-0.6°C	**-0.7°C**	**-0.8°C**	**-0.8°C**	-0.6°C
***2011-2012**	-1.1°C	**-1.0°C**	**-0.9°C**	**-0.7°C**	-0.6°C
***2017-2018**	-0.8°C	**-1.0°C**	**-0.9°C**	**-0.9°C**	-0.7°C
***2022-2023**	-0.9°C	**-0.8°C**	**-0.7°C**	**-0.4°C**	-0.1°C

Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

- For a weak La Niña event to be classified, the ONI must fall between **(-0.5)°C** and **(-0.9)°C** for five consecutive overlapping 3-month periods (OND, NDJ, DJF, etc.). The specific periods for winter focus on **November to March.**
- OND = October, November, December
- **NDJ = November, December, January**
- **DJF = December, January, February**
- **JFM = January, February, March**
- FMA = February, March, April

*Note: Some of the outlined seasons start with a “weak” moderate La Nina OND and NDJ and/or go into ENSO Neutral JFM and FMA.

Weak La Niña Winter Seasons Last 30 Years

Winter Season	OND	NDJ	DJF	JFM	FMA
***1995-1996**	-1.0°C	**-1.0°C**	**-0.9°C**	**-0.8°C**	-0.6°C
***1996-1997**	-0.4°C	**-0.5°C**	**-0.5°C**	**-0.4°C**	-0.1°C
***2000-2001**	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.5°C**	-0.4°C
2005-2006	-0.6°C	**-0.8°C**	**-0.9°C**	**-0.8°C**	-0.6°C
2008-2009	-0.6°C	**-0.7°C**	**-0.8°C**	**-0.8°C**	-0.6°C
***2011-2012**	-1.1°C	**-1.0°C**	**-0.9°C**	**-0.7°C**	-0.6°C
***2017-2018**	-0.8°C	**-1.0°C**	**-0.9°C**	**-0.9°C**	-0.7°C
***2022-2023**	-0.9°C	**-0.8°C**	**-0.7°C**	**-0.4°C**	-0.1°C

Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

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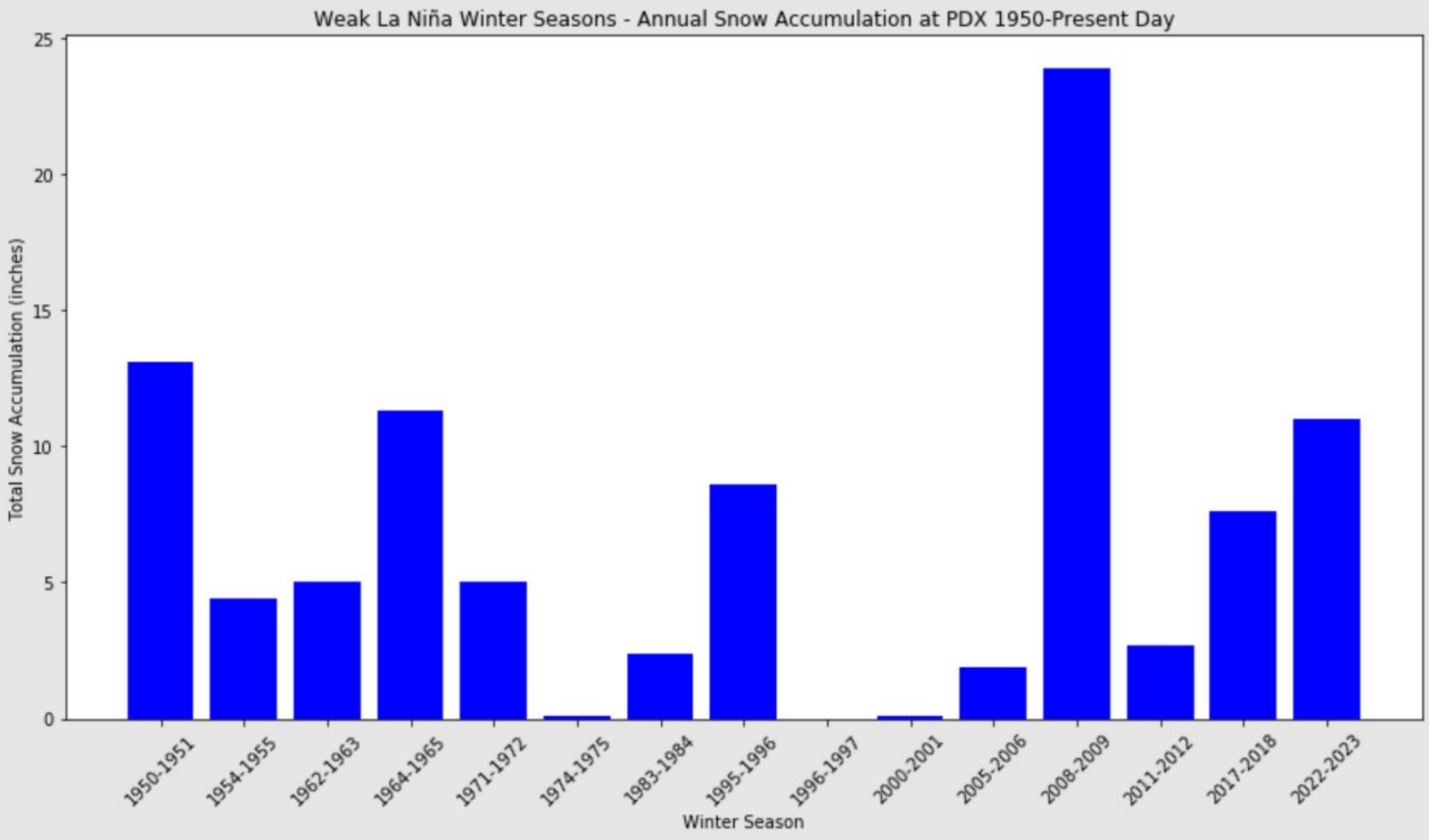
- **NDJ = November, December, January**
- **DJF = December, January, February**
- **JFM = January, February, March**
- FMA = February, March, April

*Note: Some of the outlined seasons start with a moderate La Nina OND and NDJ and/or go into ENSO Neutral JFM and FMA.

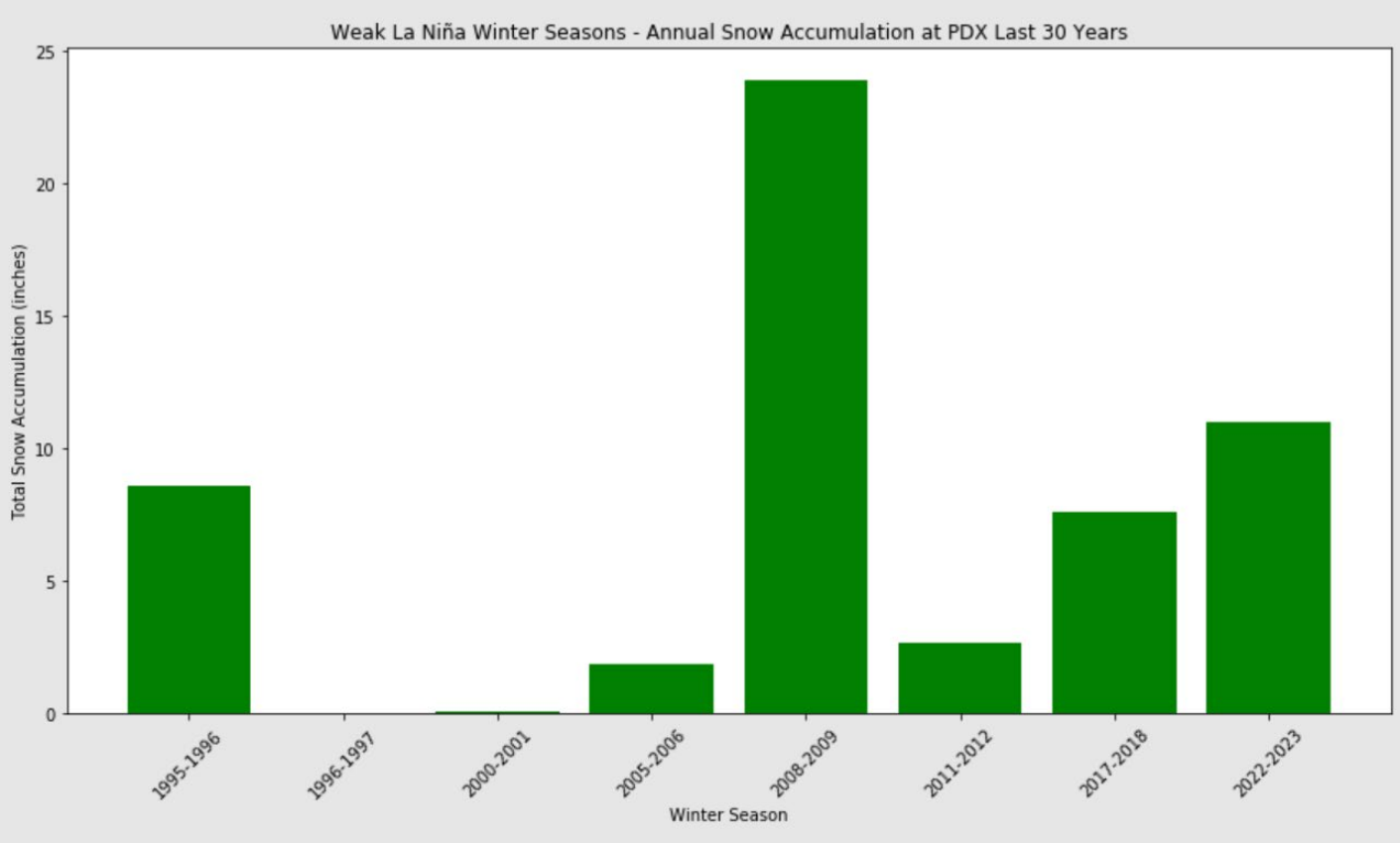
Weak La Niña Winter Seasons Since 1950



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

Winter Season	Total Snow Accumulation
*1950-1951	13.1”
1954-1955	4.4”
1962-1963	5.0”
*1964-1965	11.3”
*1971-1972	5.0”
1974-1975	0.1”
*1983-1984	2.4”
*1995-1996	8.6”
*1996-1997	0.0”
*2000-2001	0.1”
2005-2006	1.9”
2008-2009	23.9”
*2011-2012	2.7”
*2017-2018	7.6”
*2022-2023	11.0”

Weak La Niña Winter Seasons Last 30 Years



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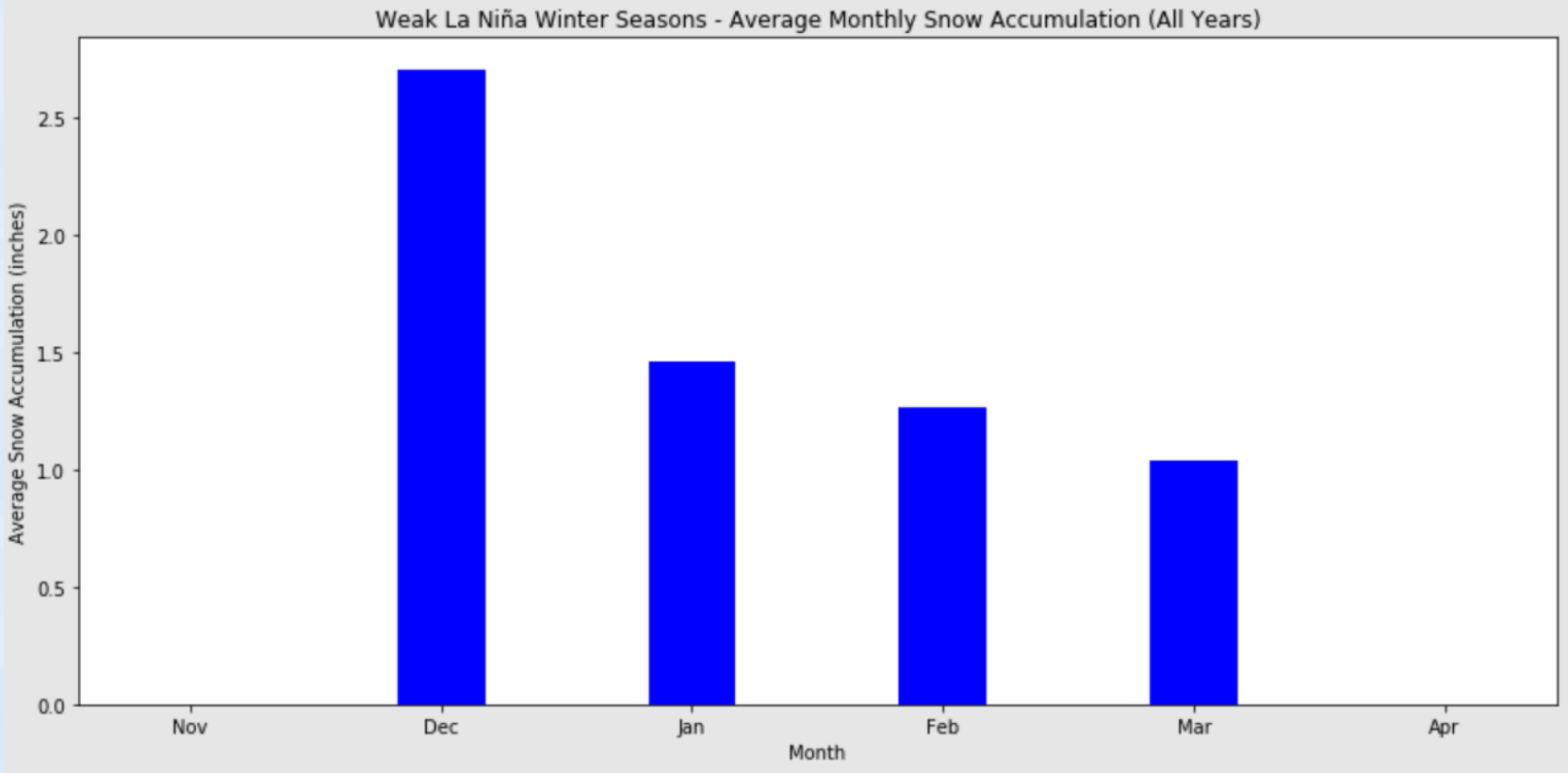
Winter Season	Total Snow Accumulation
*1995-1996	8.6”
*1996-1997	0.0”
*2000-2001	0.1”
2005-2006	1.9”
2008-2009	23.9”
*2011-2012	2.7”
*2017-2018	7.6”
*2022-2023	11.0”

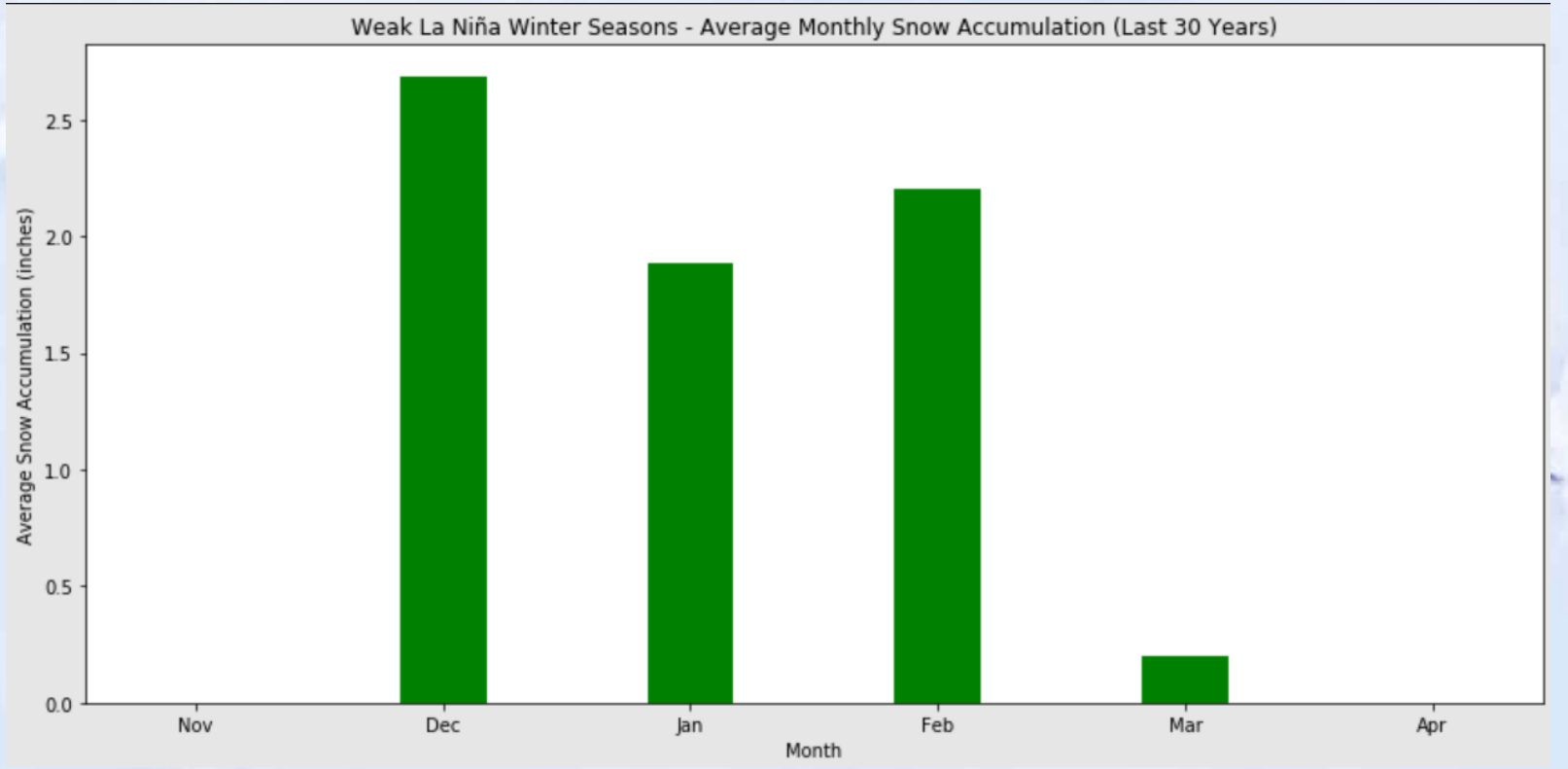
Weak La Niña Winter Seasons Since 1950



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

Month	Average Accumulation
November	0.00”
December	2.71”
January	1.46”
February	1.27”
March	1.04”
April	0.00”

Weak La Niña Winter Seasons Last 30 Years



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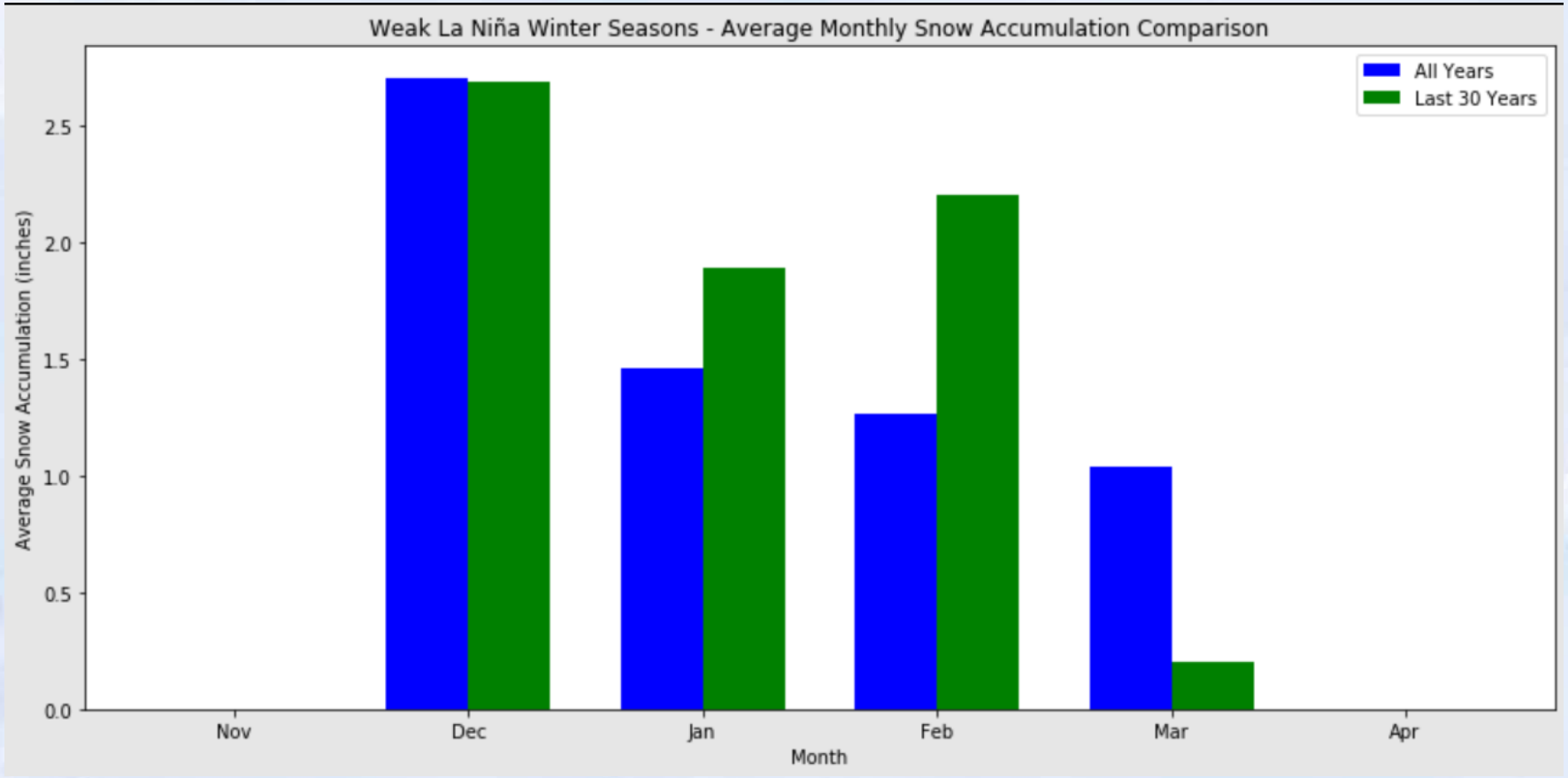
Month	Average Accumulation
November	0.00”
December	2.68”
January	1.89”
February	2.20”
March	0.20”
April	0.00”

Weak La Niña Winter Seasons



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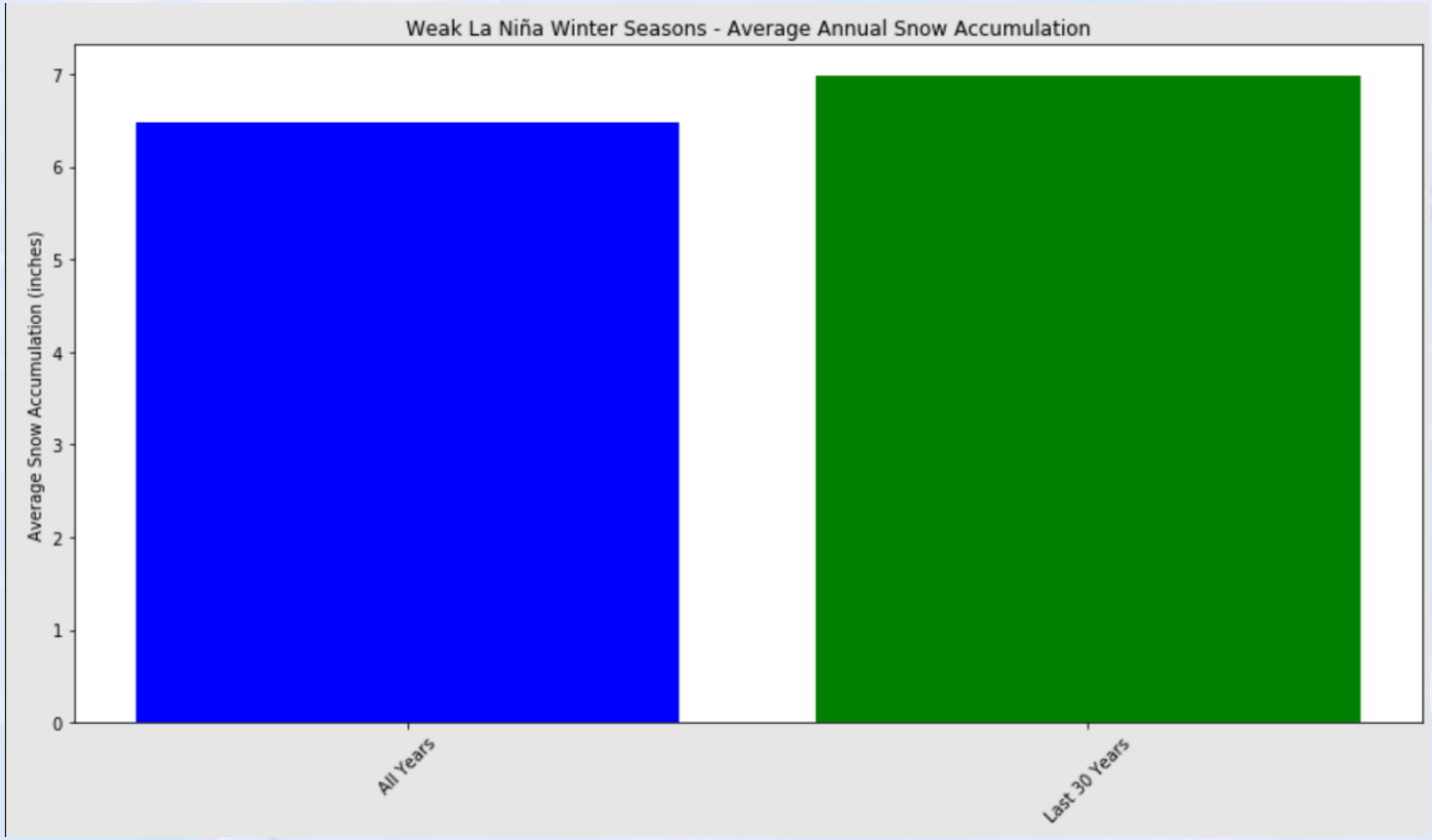
Weak La Niña Winter Seasons



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Periods	Average Annual Season Snow Accumulation
All Years	6.47”
Last 30 Years	6.98”

Let’s Define Proxy Years- ONI

ENSO Outlook for Winter 2024-2025

Model	OND	NDJ	DJF	JFM	FMA
Average Dynamical models	-0.834 °C	-0.862 °C	-0.770 °C	-0.640 °C	-0.467 °C
Average Statistical models	-0.289°C	-0.336 °C	-0.339 °C	-0.286 °C	-0.218 °C
Average All models	**-0.620 °C**	**-0.656 °C**	**-0.601 °C**	**-0.478 °C**	**-0.336 °C**

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Set of filters:

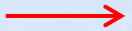
Considering all five 3-month periods:

- OND: (-0.3) °C - (-0.8)°C
- NDJ: (-0.3) °C - (-0.9)°C
- DJF: (-0.3) °C - (-0.8)°C
- JFM: (-0.3) °C - (-0.6)°C
- FMA: (-0.2) °C - (-0.5)°C

Let's Define Proxy Years- ONI

Winter Season	OND	NDJ	DJF	JFM	FMA
1950-1951	-0.6°C	**-0.8°C**	**-0.8°C**	**-0.5°C**	-0.2°C
~~**1954-1955**~~	~~-0.7°C~~	~~**-0.7°C**~~	~~**-0.7°C**~~	~~**-0.6°C**~~	~~-0.7°C~~
1962-1963	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.7°C**	-0.5°C
~~**1964-1965**~~	~~-0.8°C~~	~~**-0.8°C**~~	~~**-0.6°C**~~	~~**-0.3°C**~~	~~-0.1°C~~
~~**1971-1972**~~	~~-1.0°C~~	~~**-0.9°C**~~	~~**-0.7°C**~~	~~**-0.4°C**~~	~~-0.1°C~~
~~**1974-1975**~~	~~-0.8°C~~	~~**-0.6°C**~~	~~**-0.5°C**~~	~~**-0.6°C**~~	~~-0.7°C~~
~~**1983-1984**~~	~~-1.0°C~~	~~**-0.9°C**~~	~~**-0.6°C**~~	~~**-0.4°C**~~	~~-0.3°C~~
~~**1995-1996**~~	~~-1.0°C~~	~~**-1.0°C**~~	~~**-0.9°C**~~	~~**-0.8°C**~~	~~-0.6°C~~
~~**1996-1997**~~	~~-0.4°C~~	~~**-0.5°C**~~	~~**-0.5°C**~~	~~**-0.4°C**~~	~~-0.1°C~~
2000-2001	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.5°C**	-0.4°C
~~**2005-2006**~~	~~-0.6°C~~	~~**-0.8°C**~~	~~**-0.9°C**~~	~~**-0.8°C**~~	~~-0.6°C~~
~~**2008-2009**~~	~~-0.6°C~~	~~**-0.7°C**~~	~~**-0.8°C**~~	~~**-0.8°C**~~	~~-0.6°C~~
~~**2011-2012**~~	~~-1.1°C~~	~~**-1.0°C**~~	~~**-0.9°C**~~	~~**-0.7°C**~~	~~-0.6°C~~
~~**2017-2018**~~	~~-0.8°C~~	~~**-1.0°C**~~	~~**-0.9°C**~~	~~**-0.9°C**~~	~~-0.7°C~~
~~**2022-2023**~~	~~-0.9°C~~	~~**-0.8°C**~~	~~**-0.7°C**~~	~~**-0.4°C**~~	~~-0.1°C~~

Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php



Proxy Table

Winter Season	OND	NDJ	DJF	JFM	FMA
1950-1951	-0.6°C	**-0.8°C**	**-0.8°C**	**-0.5°C**	-0.2°C
1962-1963	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.7°C**	-0.5°C
2000-2001	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.5°C**	-0.4°C

Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

Let's Define Proxy Years- ONI

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Set of filters:

Let's only look at the three 3-month periods we are defining as "winter". We will add these to our proxy years.

- NDJ: (-0.3) °C - (-0.9)°C
- DJF: (-0.3) °C - (-0.8)°C
- JFM: (-0.3) °C - (-0.6)°C

Let's Define Proxy Years- ONI

Winter Season	OND	NDJ	DJF	JFM	FMA
1950-1951	-0.6°C	-0.8°C	-0.8°C	-0.5°C	-0.2°C
1954-1955	-0.7°C	-0.7°C	-0.7°C	-0.6°C	-0.7°C
1962-1963	-0.7°C	-0.7°C	-0.7°C	-0.7°C	-0.5°C
1964-1965	-0.8°C	-0.8°C	-0.6°C	-0.3°C	-0.1°C
1971-1972	-1.0°C	-0.9°C	-0.7°C	-0.4°C	-0.1°C
1974-1975	-0.8°C	-0.6°C	-0.5°C	-0.6°C	-0.7°C
1983-1984	-1.0°C	-0.9°C	-0.6°C	-0.4°C	-0.3°C
~~1995-1996~~	~~-1.0°C~~	~~-1.0°C~~	~~-0.9°C~~	~~-0.8°C~~	~~-0.6°C~~
1996-1997	-0.4°C	-0.5°C	-0.5°C	-0.4°C	-0.1°C
2000-2001	-0.7°C	-0.7°C	-0.7°C	-0.5°C	-0.4°C
~~2005-2006~~	~~-0.6°C~~	~~-0.8°C~~	~~-0.9°C~~	~~-0.8°C~~	~~-0.6°C~~
2008-2009	-0.6°C	-0.7°C	-0.8°C	-0.8°C	-0.6°C
~~2011-2012~~	~~-1.1°C~~	~~-1.0°C~~	~~-0.9°C~~	~~-0.7°C~~	~~-0.6°C~~
~~2017-2018~~	~~-0.8°C~~	~~-1.0°C~~	~~-0.9°C~~	~~-0.9°C~~	~~-0.7°C~~
2022-2023	-0.9°C	-0.8°C	-0.7°C	-0.4°C	-0.1°C

Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

Updated Proxy Table

Winter Season	OND	NDJ	DJF	JFM	FMA
1950-1951	-0.6°C	-0.8°C	-0.8°C	-0.5°C	-0.2°C
1954-1955	-0.7°C	-0.7°C	-0.7°C	-0.6°C	-0.7°C
1962-1963	-0.7°C	-0.7°C	-0.7°C	-0.7°C	-0.5°C
1964-1965	-0.8°C	-0.8°C	-0.6°C	-0.3°C	-0.1°C
1971-1972	-1.0°C	-0.9°C	-0.7°C	-0.4°C	-0.1°C
1974-1975	-0.8°C	-0.6°C	-0.5°C	-0.6°C	-0.7°C
1983-1984	-1.0°C	-0.9°C	-0.6°C	-0.4°C	-0.3°C
1996-1997	-0.4°C	-0.5°C	-0.5°C	-0.4°C	-0.1°C
2000-2001	-0.7°C	-0.7°C	-0.7°C	-0.5°C	-0.4°C
2008-2009	-0.6°C	-0.7°C	-0.8°C	-0.8°C	-0.6°C
2022-2023	-0.9°C	-0.8°C	-0.7°C	-0.4°C	-0.1°C

Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

Defined Proxy Years- ONI

ONI Proxy Table- All Years

Winter Season	OND	NDJ	DJF	JFM	*FMA
*1950-1951	-0.6°C	**-0.8°C**	**-0.8°C**	**-0.5°C**	-0.2°C
1954-1955	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.6°C**	-0.7°C
*1962-1963	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.7°C**	-0.5°C
1964-1965	-0.8°C	**-0.8°C**	**-0.6°C**	**-0.3°C**	-0.1°C
1971-1972	-1.0°C	**-0.9°C**	**-0.7°C**	**-0.4°C**	-0.1°C
1974-1975	-0.8°C	**-0.6°C**	**-0.5°C**	**-0.6°C**	-0.7°C
1983-1984	-1.0°C	**-0.9°C**	**-0.6°C**	**-0.4°C**	-0.3°C
1996-1997	-0.4°C	**-0.5°C**	**-0.5°C**	**-0.4°C**	-0.1°C
*2000-2001	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.5°C**	-0.4°C
2008-2009	-0.6°C	**-0.7°C**	**-0.8°C**	**-0.8°C**	-0.6°C
2022-2023	-0.9°C	**-0.8°C**	**-0.7°C**	**-0.4°C**	-0.1°C

Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

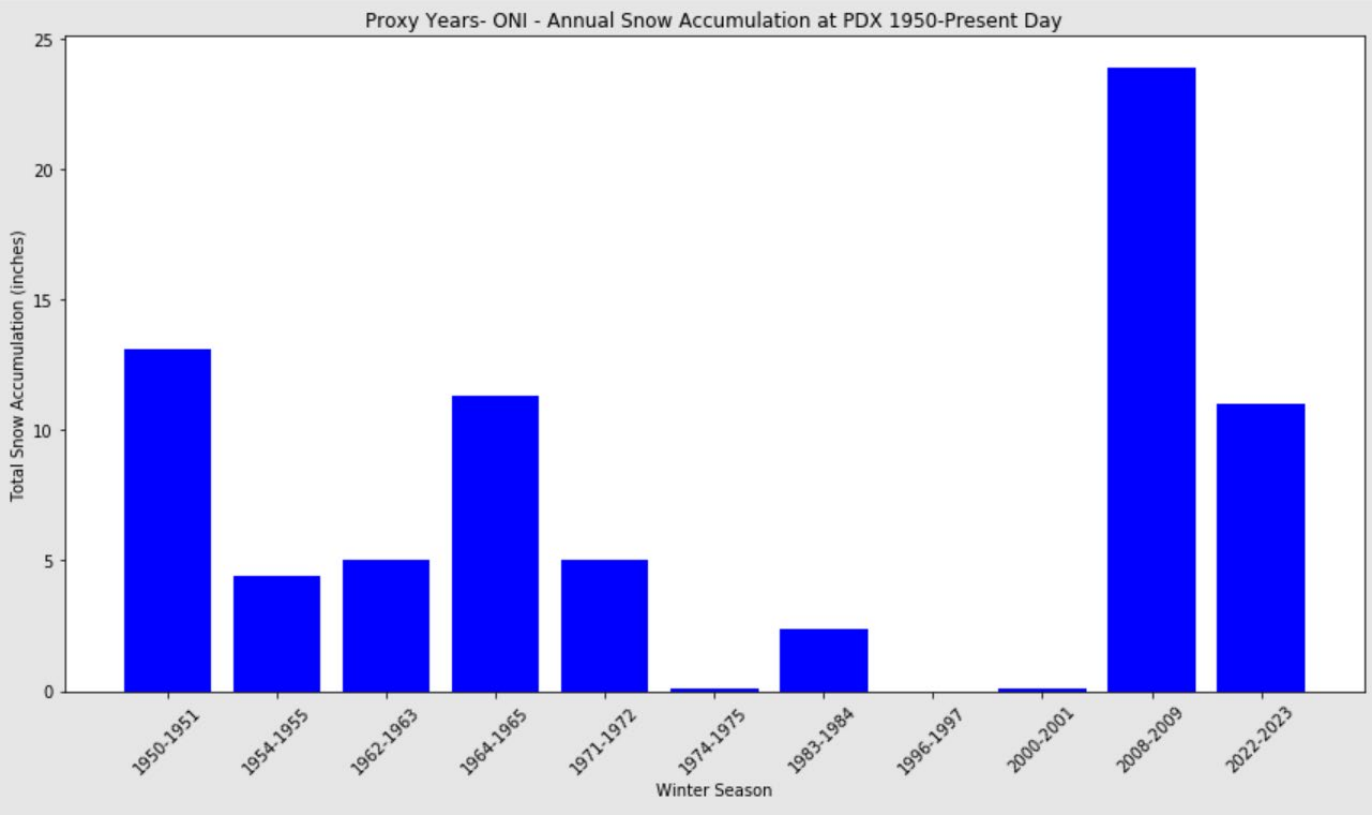
*** Note: All five 3-month periods meet the initial ONI credentials.**

ONI Proxy Table- Last 30 Years

Winter Season	OND	NDJ	DJF	JFM	FMA
1996-1997	-0.4°C	**-0.5°C**	**-0.5°C**	**-0.4°C**	-0.1°C
*2000-2001	-0.7°C	**-0.7°C**	**-0.7°C**	**-0.5°C**	-0.4°C
2008-2009	-0.6°C	**-0.7°C**	**-0.8°C**	**-0.8°C**	-0.6°C
2022-2023	-0.9°C	**-0.8°C**	**-0.7°C**	**-0.4°C**	-0.1°C

Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

ONI Proxy Years- All Years

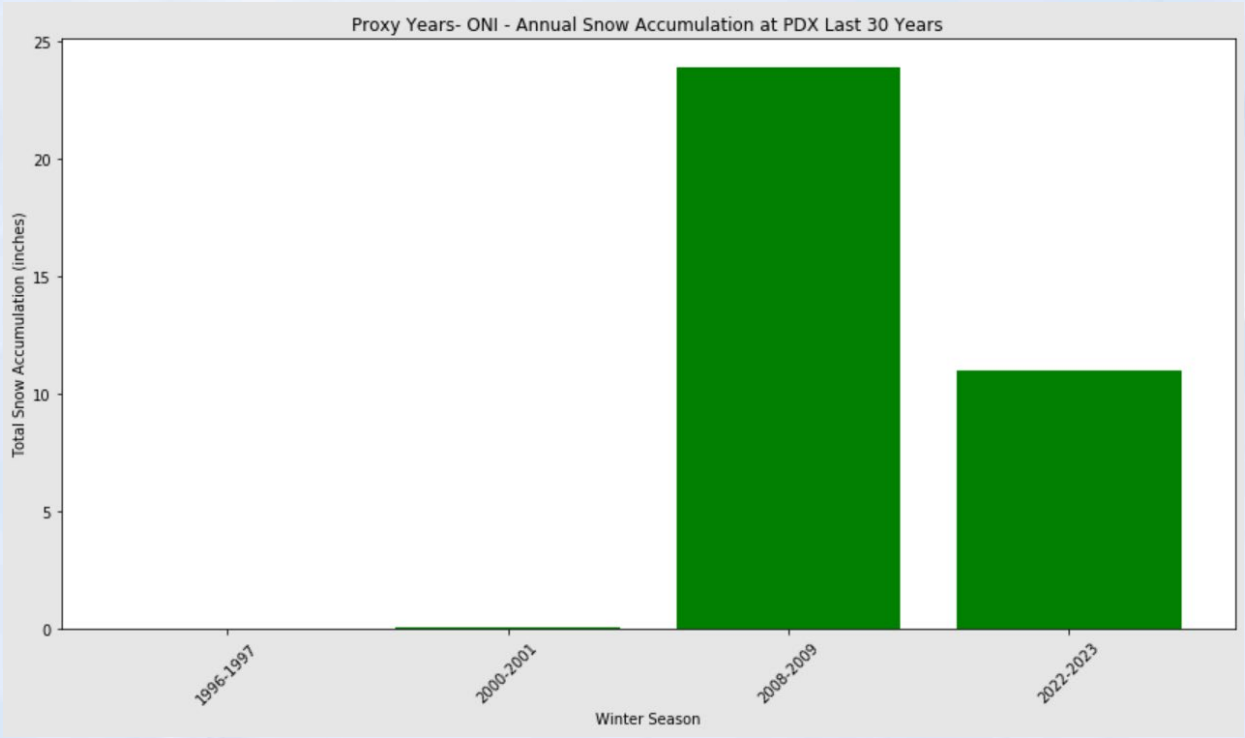


Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

Winter Season	Total Snow Accumulation
*1950-1951	13.1”
1954-1955	4.4”
*1962-1963	5.0”
1964-1965	11.3”
1971-1972	5.0”
1974-1975	0.1”
1983-1984	2.4”
1996-1997	0.0”
*2000-2001	0.1”
2008-2009	23.9”
2022-2023	11.0”

*** Note: All five 3-month periods meet the initial ONI credentials.**

ONI Proxy Years-Last 30 Years

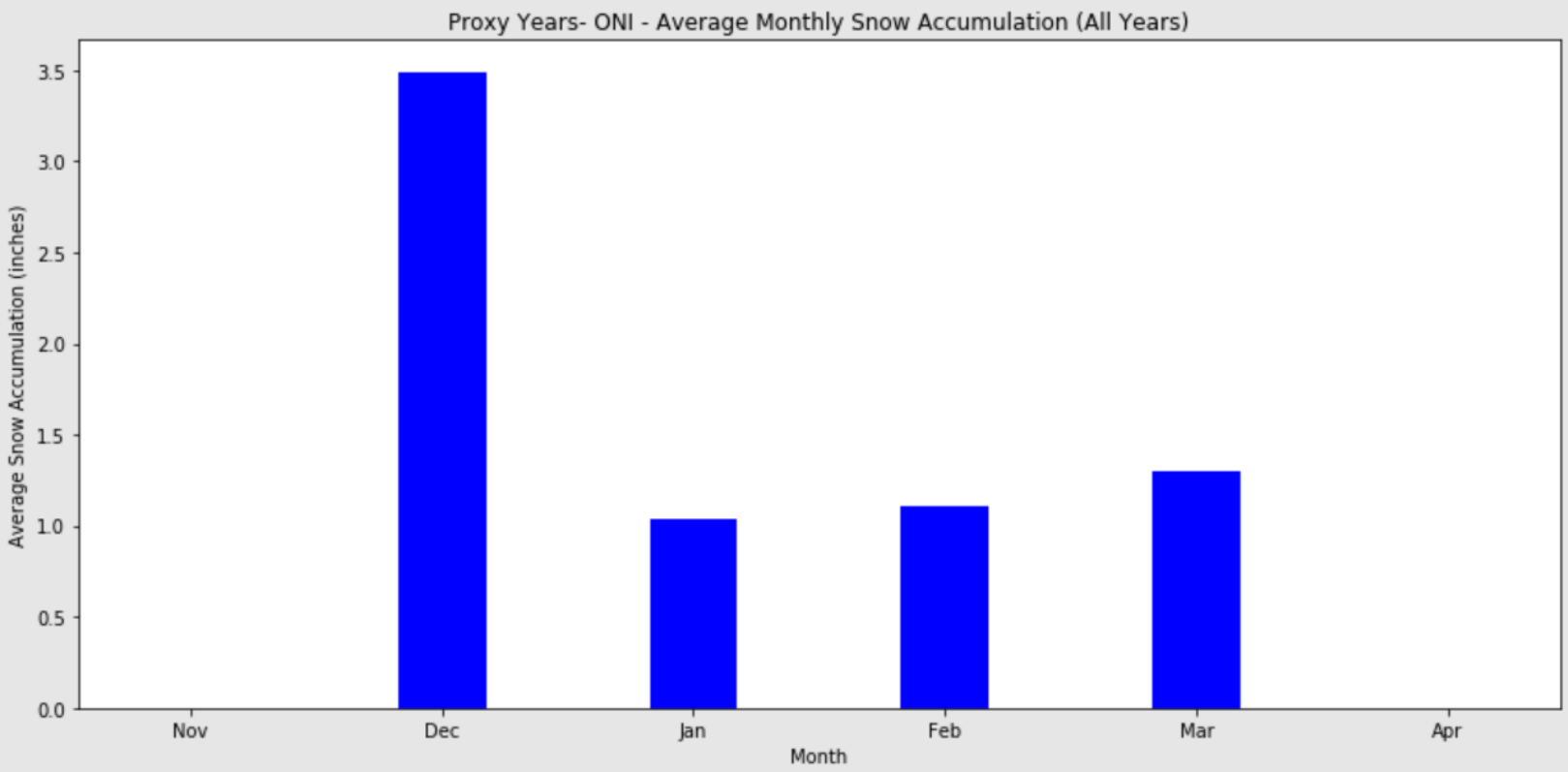


Data from NWS CPC: https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php

Winter Season	Total Snow Accumulation
1996-1997	0.0”
*2000-2001	0.1”
2008-2009	23.9”
2022-2023	11.0”

*** Note: All five 3-month periods meet the initial ONI credentials.**

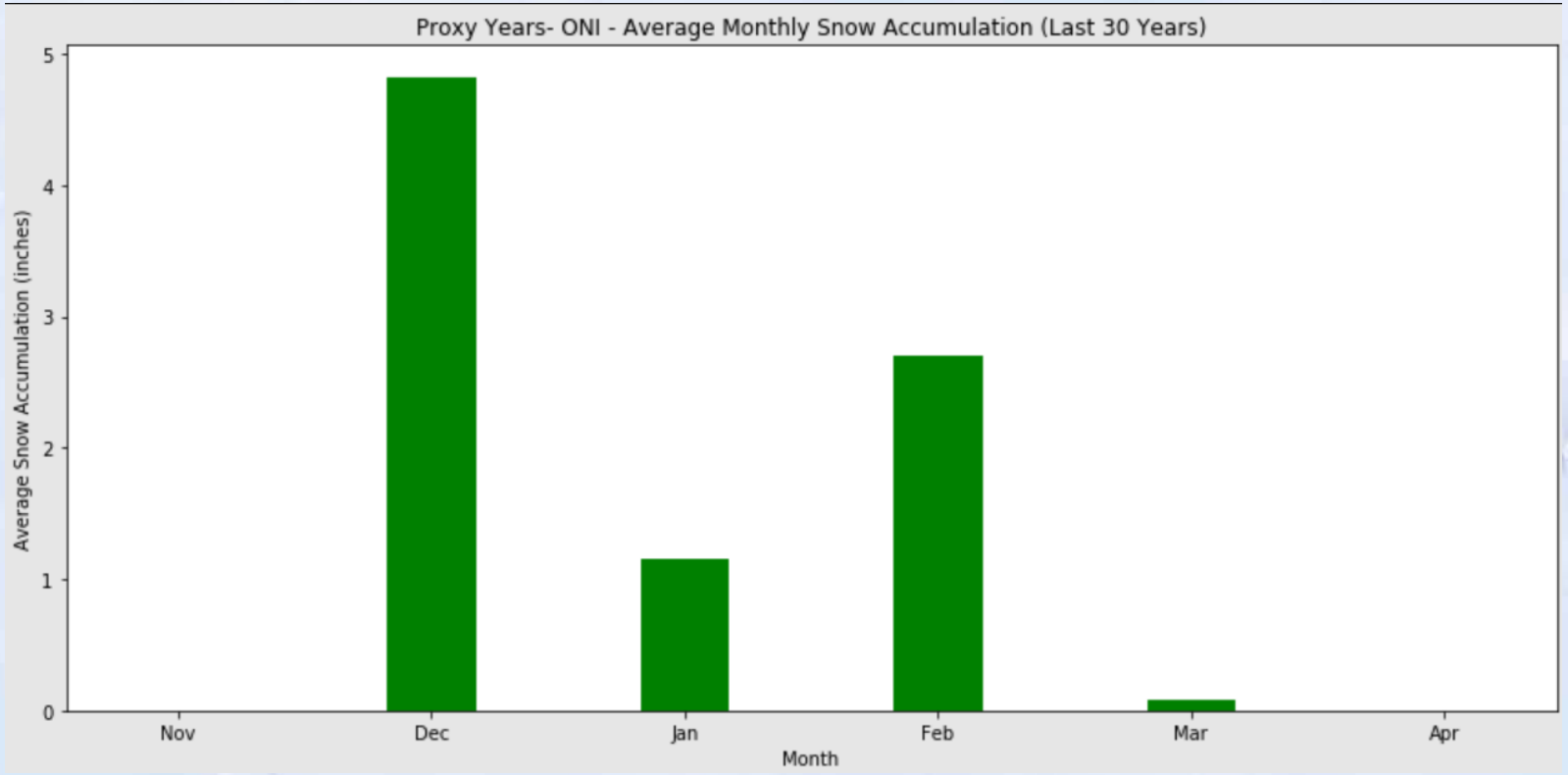
ONI Proxy Years- All Years



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

Month	Average Accumulation
November	0.00”
December	3.49”
January	1.04”
February	1.11”
March	1.3”
April	0.00”

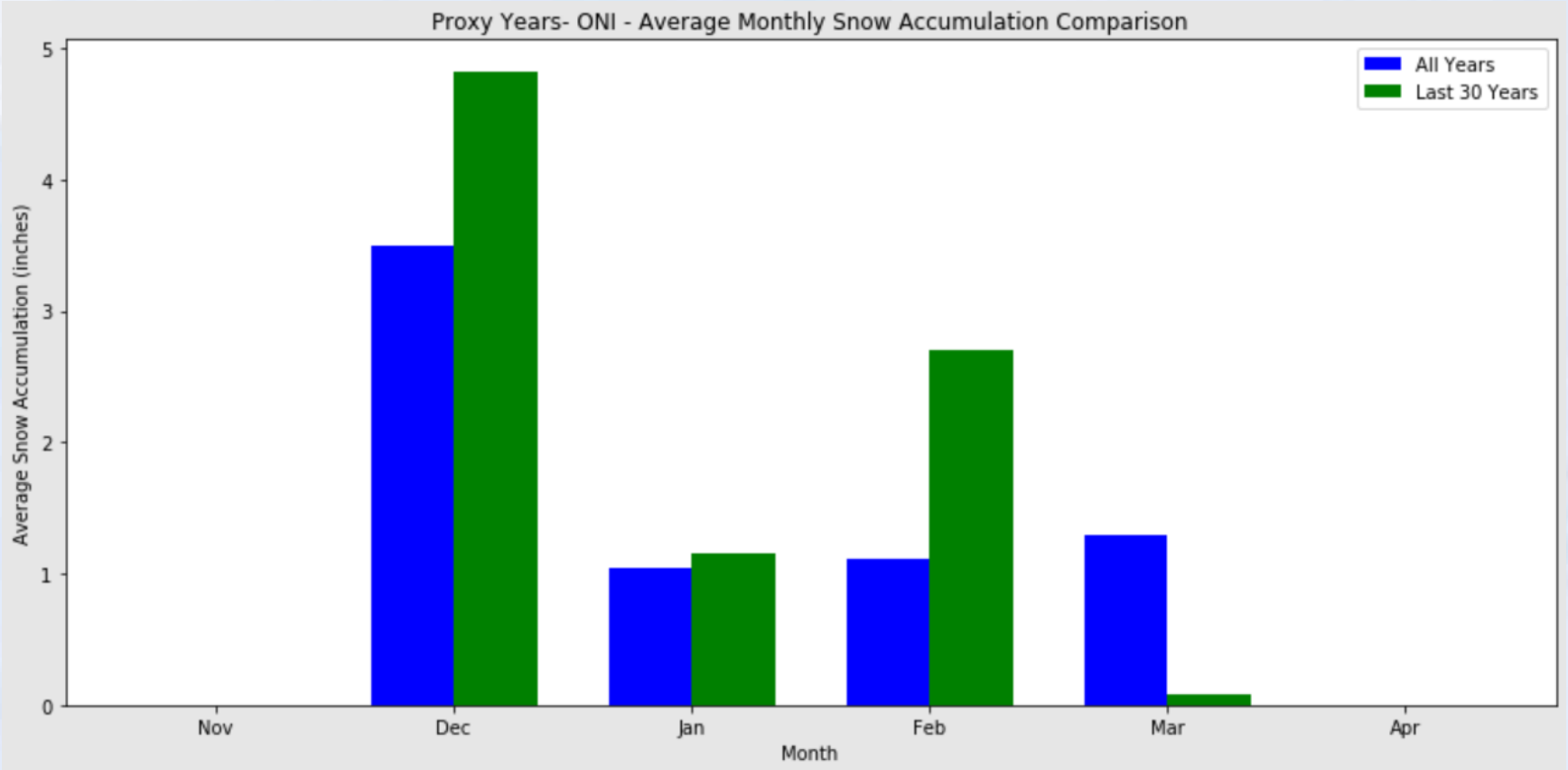
ONI Proxy Years- Last 30 Years



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

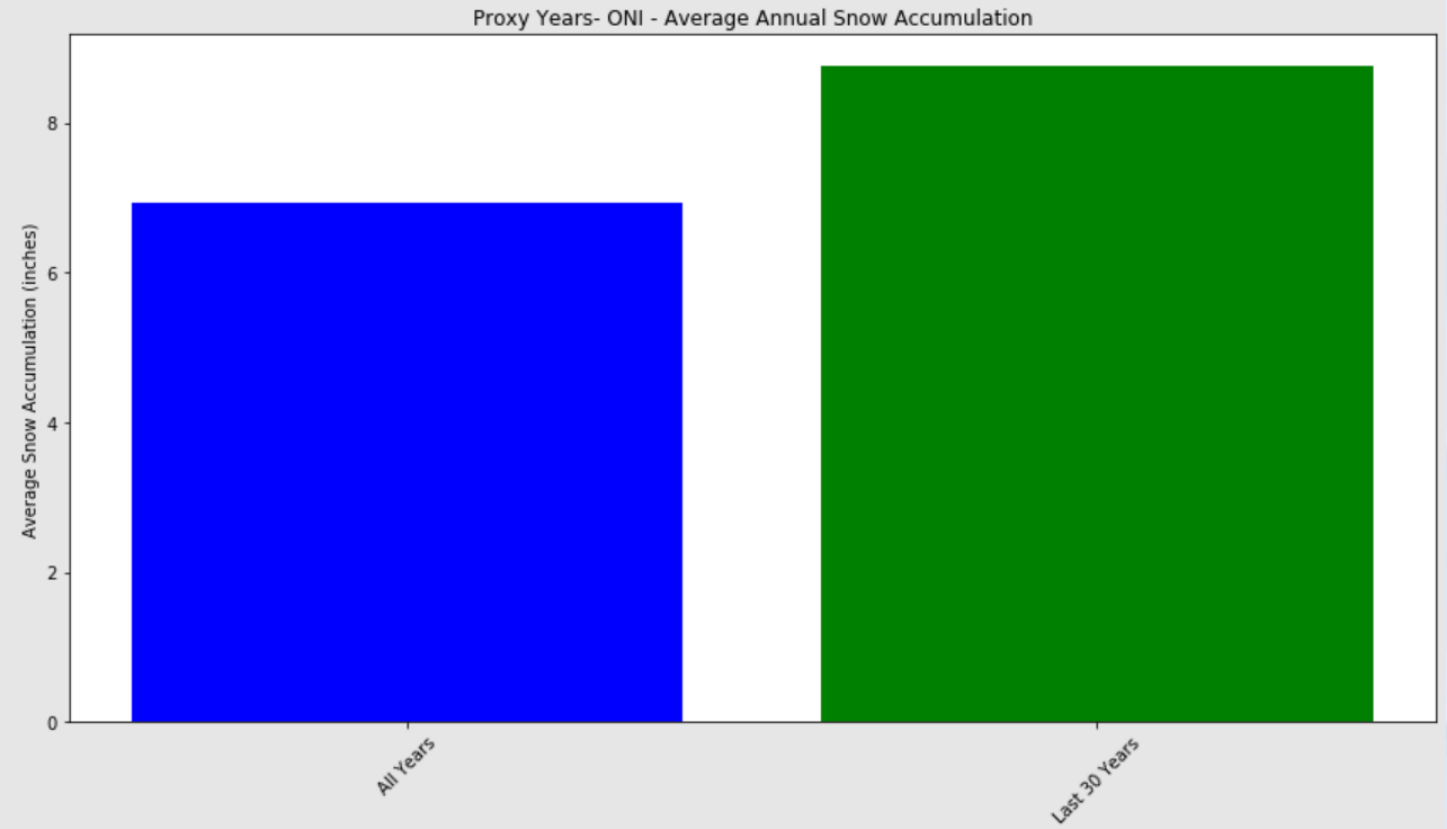
Month	Average Accumulation
November	0.00”
December	4.83”
January	1.15”
February	2.70”
March	0.08”
April	0.00”

ONI Proxy Years



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

ONI Proxy Years

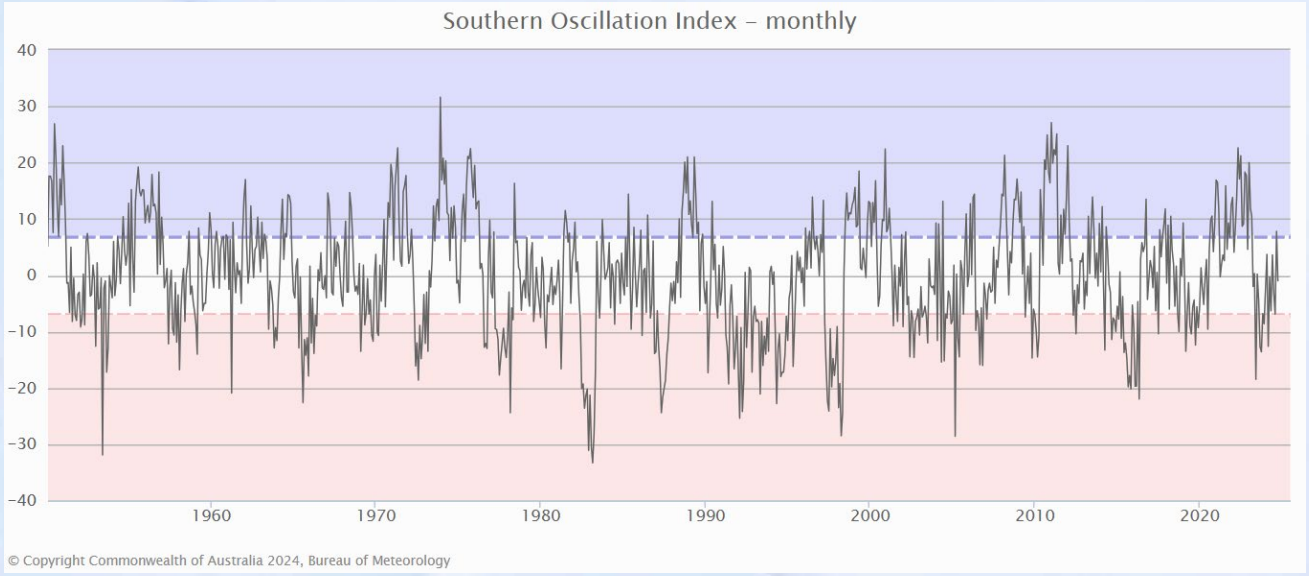


CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

Periods	Average Annual Season Snow Accumulation
All Years	6.94”
Last 30 Years	8.75”

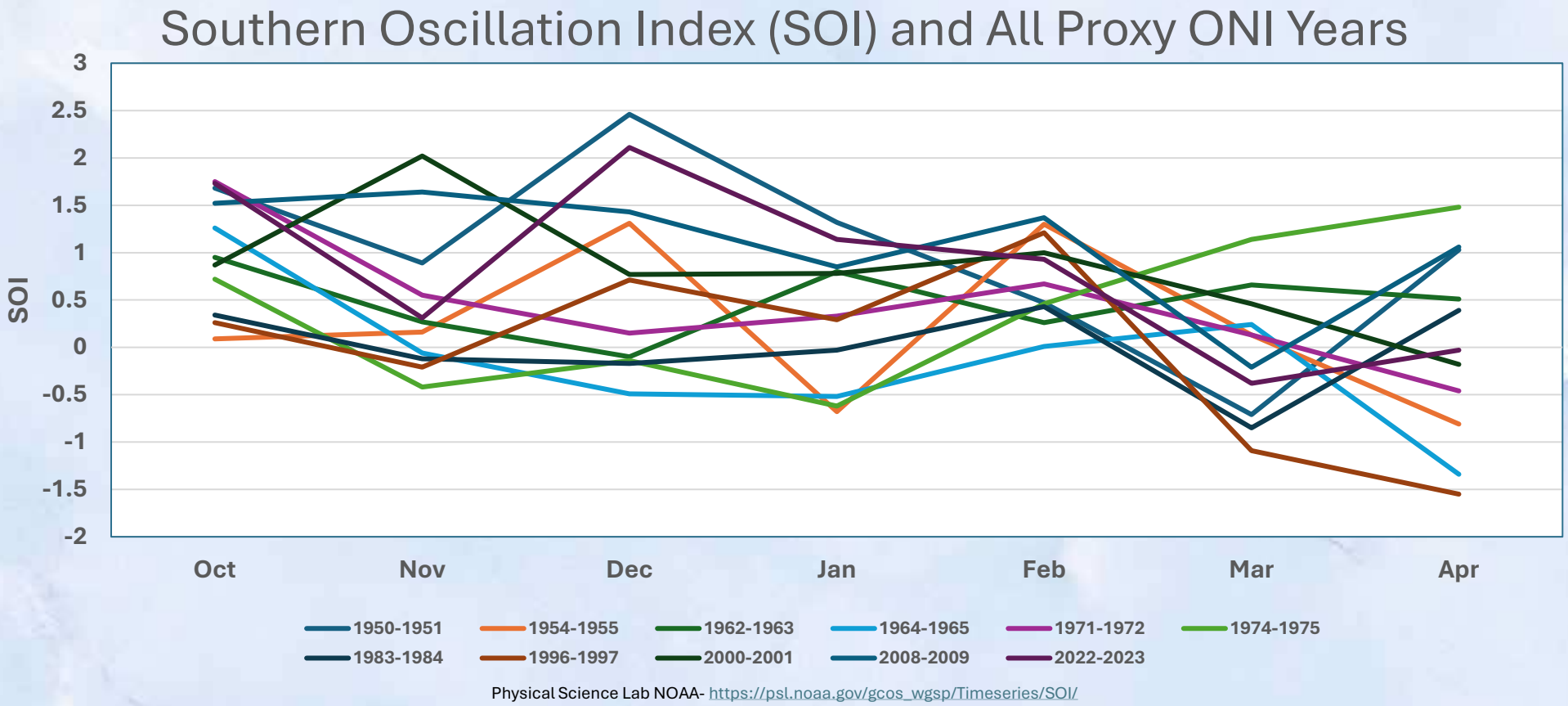
Southern Oscillation Index (SOI)

- The SOI measures the difference in atmospheric pressure between Tahiti and Darwin, Australia.
  - Positive SOI: Indicates a La Niña phase, characterized by higher-than-average pressure over Tahiti and lower-than-average pressure over Darwin.
  - Negative SOI: Indicates an El Niño phase, associated with lower-than-normal pressure over Tahiti and higher pressure over Darwin.
- SOI significantly influences global weather patterns, particularly during the winter months.



Australian Government Bureau of Meteorology: Southern Oscillation Index (SOI) history (bom.gov.au)

Southern Oscillation Index (SOI) and ONI Proxy Years- All Years



Physical Science Lab NOAA- https://psl.noaa.gov/gcos_wgsp/Timeseries/SOI/

Southern Oscillation Index (SOI) and ONI Proxy Years- All Years

Month	*1950-1951	1954-1955	*1962-1963	1964-1965	1971-1972	1974-1975	1983-1984	1996-1997	*2000-2001	2008-2009	2022-2023
Oct	1.68	0.09	0.95	1.26	1.75	0.72	0.34	0.26	0.87	1.52	1.73
Nov	0.89	0.16	0.27	-0.06	0.55	-0.42	-0.12	-0.21	2.02	1.64	0.31
Dec	2.46	1.31	-0.1	-0.49	0.15	-0.14	-0.17	0.71	0.77	1.43	2.11
Jan	1.32	-0.68	0.8	-0.52	0.33	-0.62	-0.03	0.29	0.78	0.85	1.14
Feb	0.47	1.3	0.26	0.01	0.67	0.46	0.43	1.21	1	1.37	0.93
Mar	-0.71	0.13	0.66	0.24	0.13	1.14	-0.85	-1.09	0.46	-0.21	-0.38
Apr	1.03	-0.81	0.51	-1.34	-0.46	1.48	0.39	-1.55	-0.18	1.06	-0.03

Physical Science Lab NOAA- https://psl.noaa.gov/gcos_wgsp/Timeseries/SOI/

*** Note: All five 3-month periods meet the initial ONI credentials.**

SOI and ONI Proxy Years - All Years

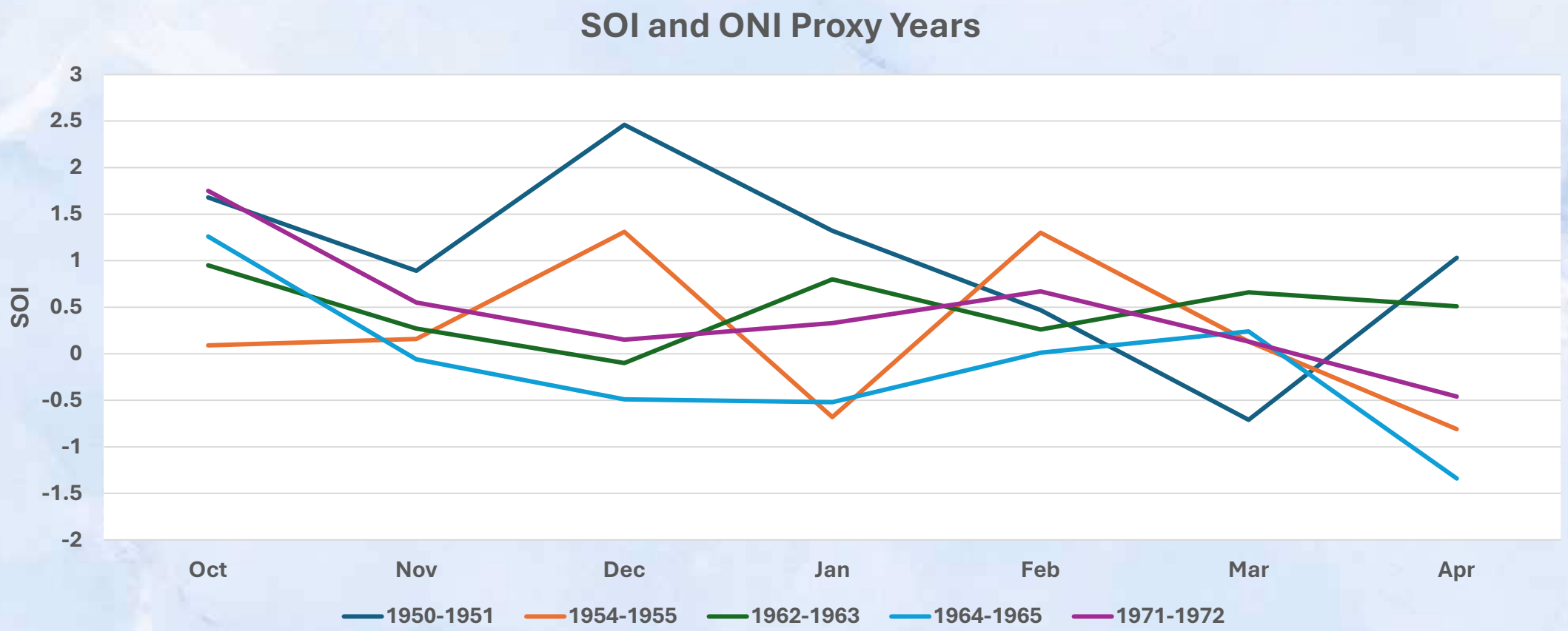
- SOI average for October 2024 (as of 10/16/24): 1.77 (https://www.longpaddock.qld.gov.au/soi/)
- Let's look at ONI proxy years with an October SOI between 1.27 and 2.27 (+/- 0.5)
  - 1964-1965 was included because it was at 1.26 for October's SOI and I figured that was close enough.

Month	*1950-1951	1964-1965	1971-1972	2008-2009	2022-2023
Oct	1.68	1.26	1.75	1.52	1.73
Nov	0.89	-0.06	0.55	1.64	0.31
Dec	2.46	-0.49	0.15	1.43	2.11
Jan	1.32	-0.52	0.33	0.85	1.14
Feb	0.47	0.01	0.67	1.37	0.93
Mar	-0.71	0.24	0.13	-0.21	-0.38
Apr	1.03	-1.34	-0.46	1.06	-0.03

Physical Science Lab NOAA- https://psl.noaa.gov/gcos_wgsp/Timeseries/SOI/

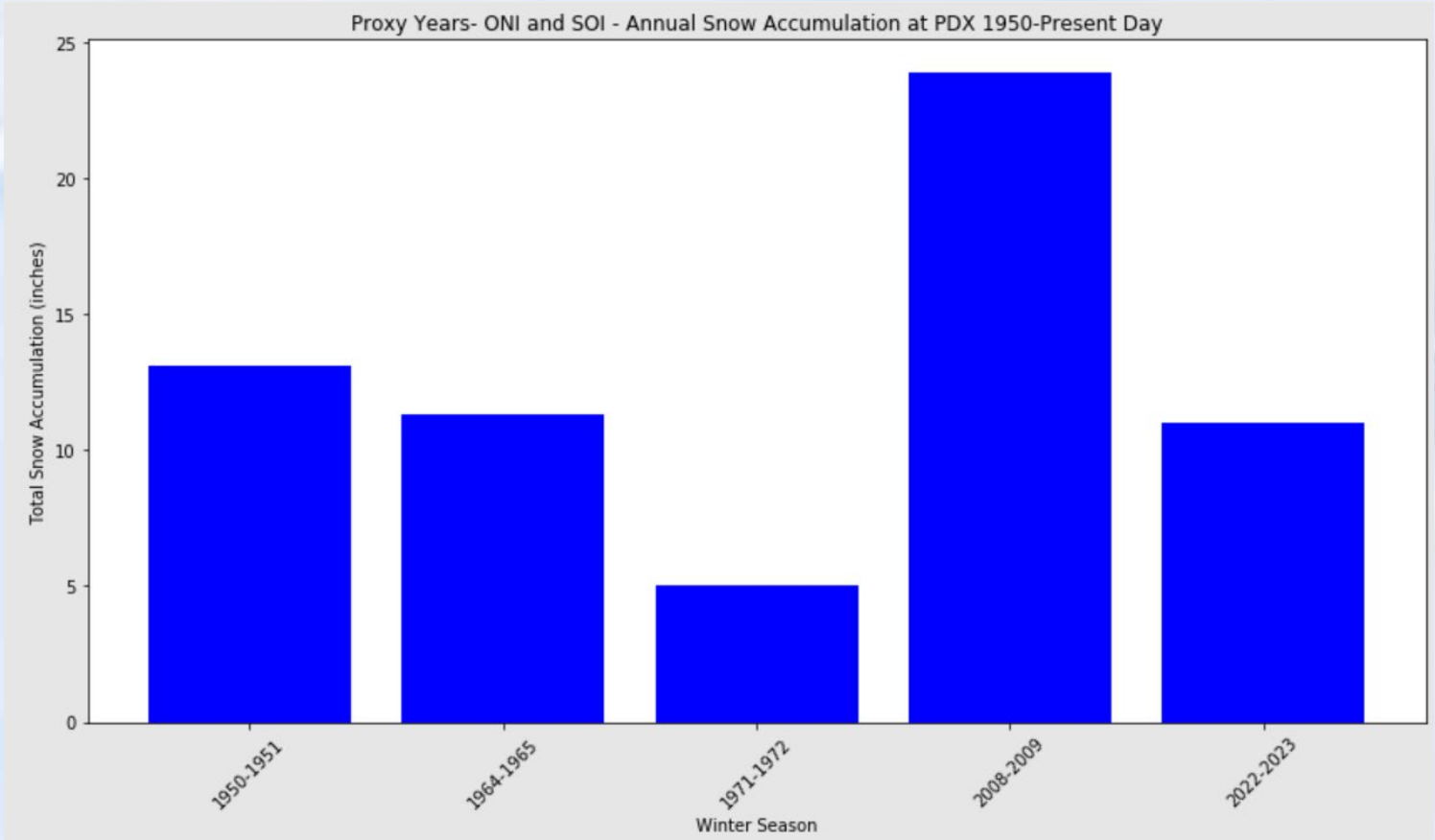
*** Note: All five 3-month periods meet the initial ONI credentials.**

SOI and ONI Proxy Years



Physical Science Lab NOAA- https://psl.noaa.gov/gcos_wgsp/Timeseries/SOI/

SOI and ONI Proxy Years- All Years

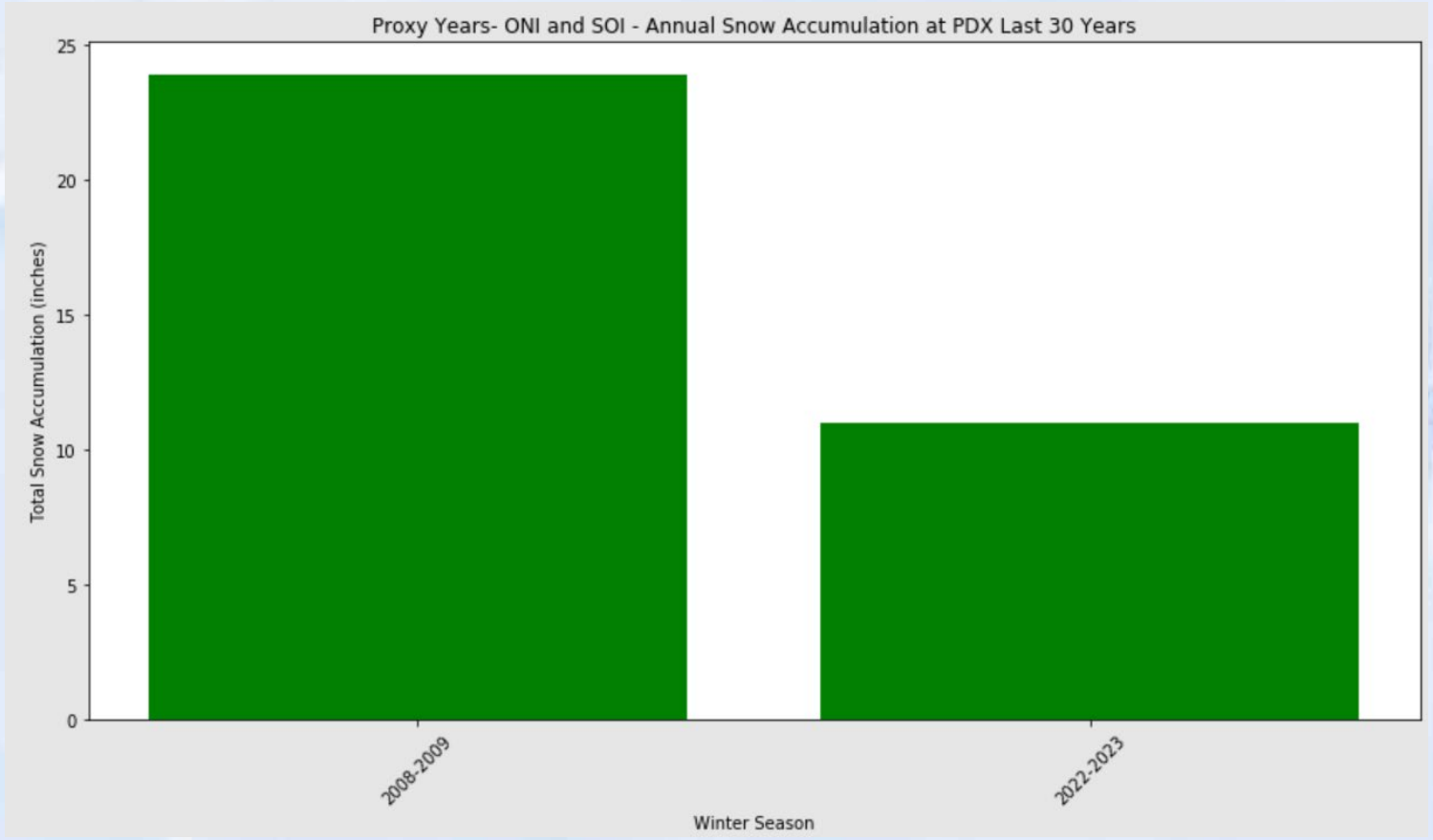


CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

Winter Season	Total Snow Accumulation
*1950-1951	13.1”
1964-1965	11.3”
1971-1972	5.0”
2008-2009	23.9”
2022-2023	11.0”

*** Note: All five 3-month periods meet the initial ONI credentials.**

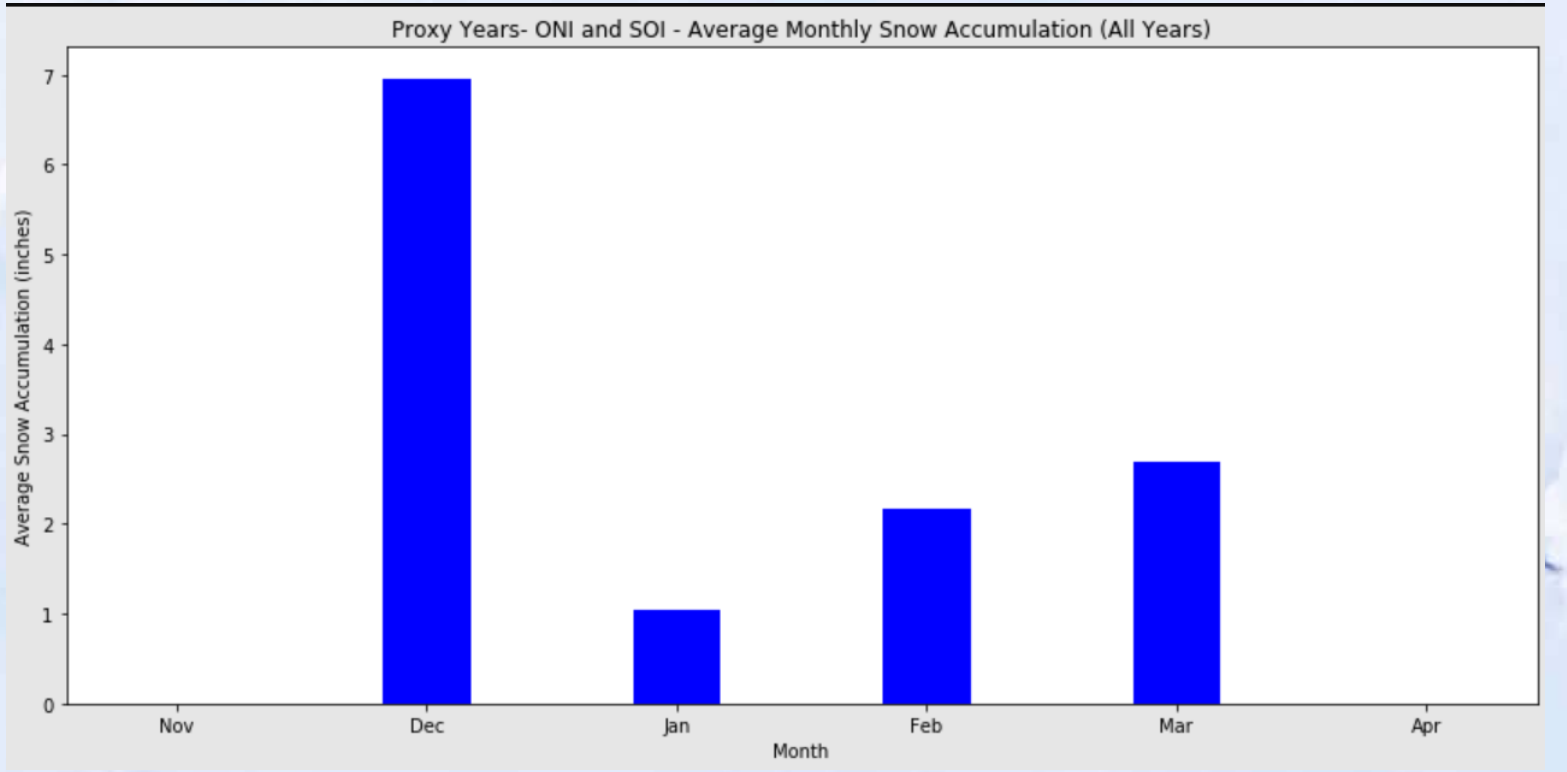
SOI and ONI Proxy Years- Last 30 Years



Winter Season	Total Snow Accumulation
2008-2009	23.9”
2022-2023	11.0”

CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

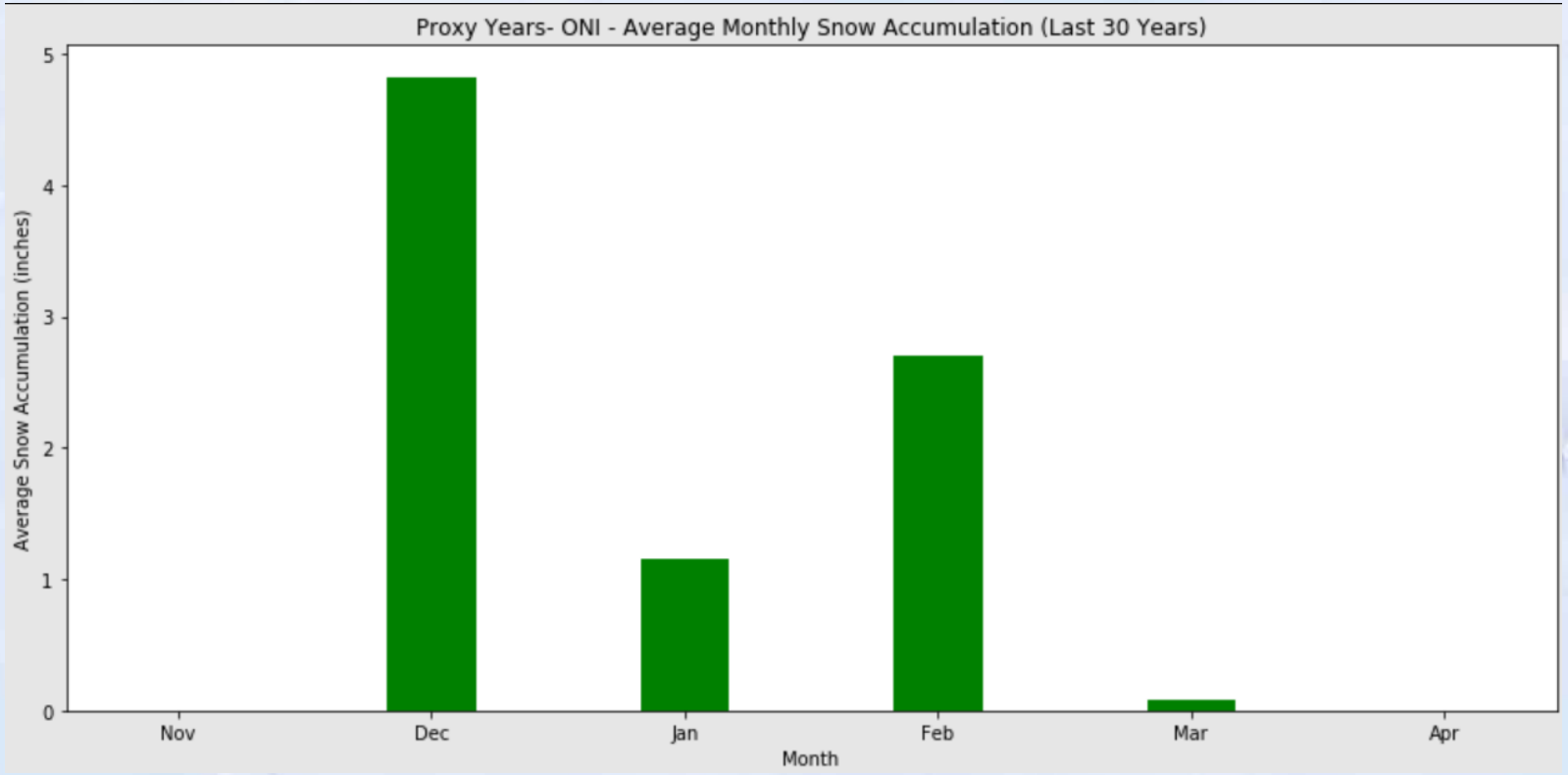
SOI and ONI Proxy Years- All Years



Month	Average Accumulation
November	0.00”
December	6.96”
January	1.04”
February	2.16”
March	2.70”
April	0.00”

CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

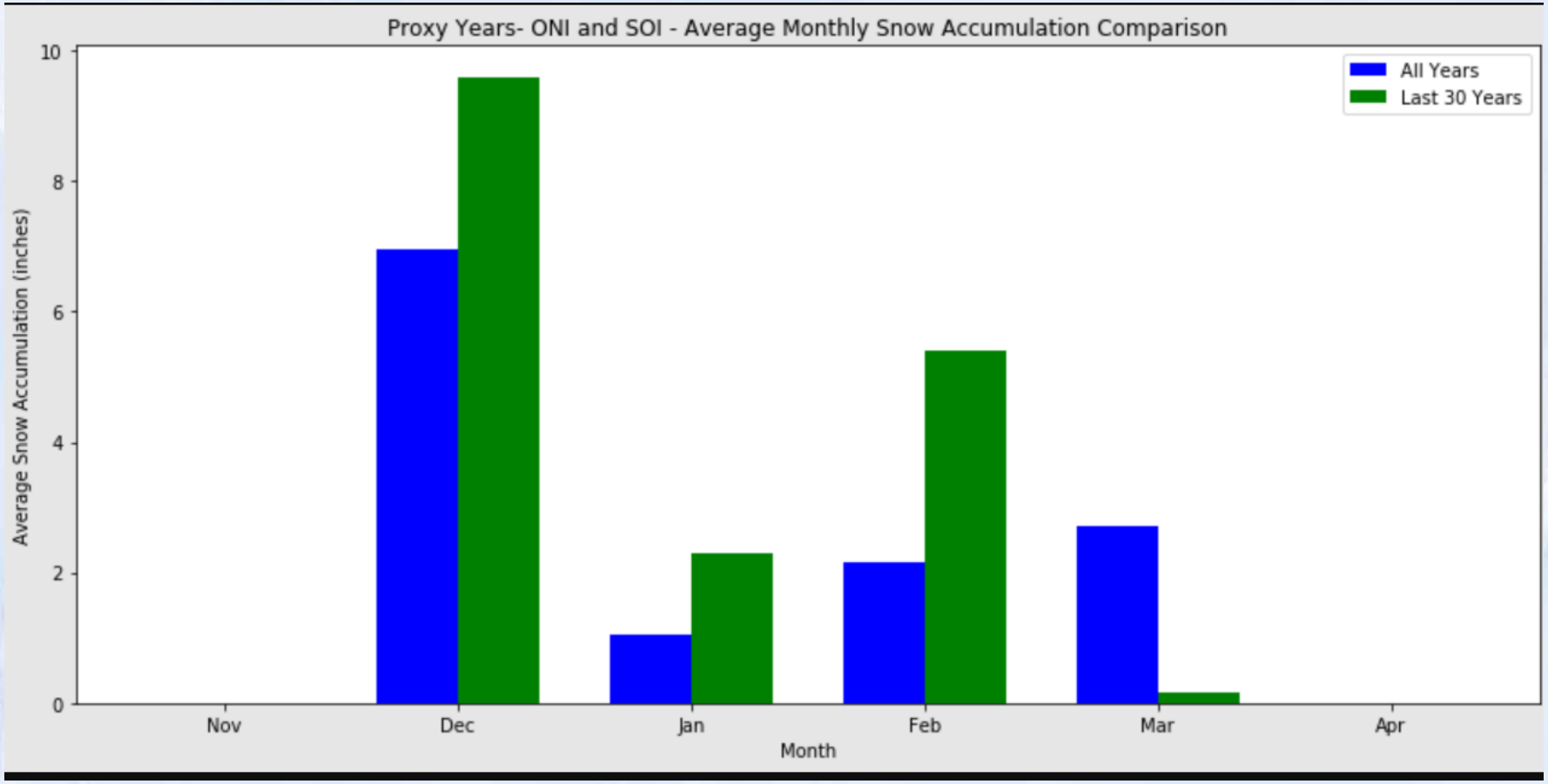
SOI and ONI Proxy Years- Last 30 Years



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

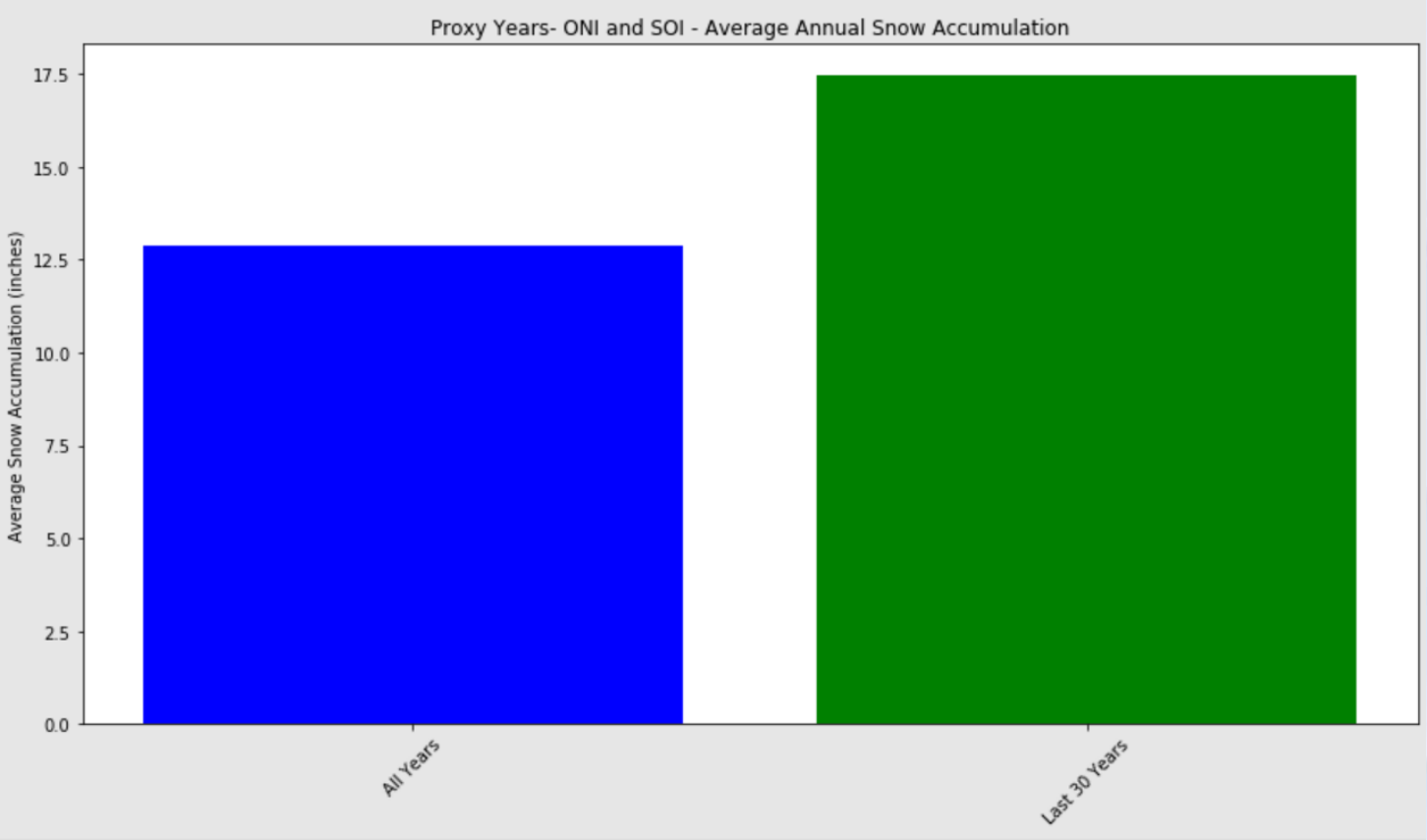
Month	Average Accumulation
November	0.00”
December	9.60”
January	2.30”
February	5.40”
March	0.15”
April	0.00”

SOI and ONI Proxy Years



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

SOI and ONI Proxy Years

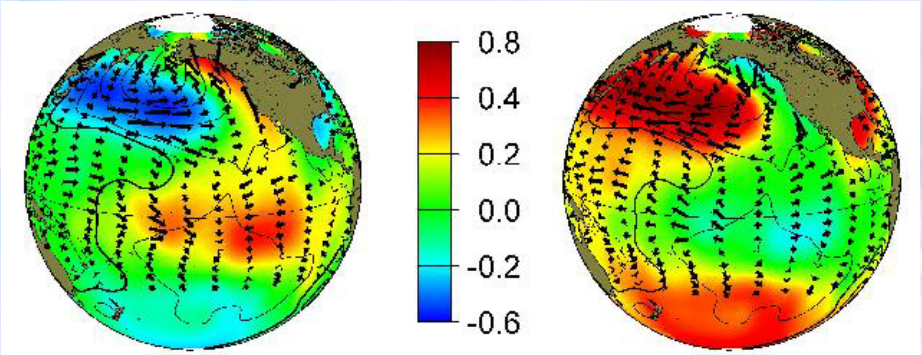


Periods	Average Annual Season Snow Accumulation
All Years	12.86”
Last 30 Years	17.45”

CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

Pacific Decadal Oscillation (PDO) 2024-2025

- Pacific Decadal Oscillation (PDO) Overview
  - The PDO is a long-term climate pattern involving shifts in sea surface temperatures (SSTs) in the North Pacific Ocean (north of 20°N latitude).
    - Two Phases:
      - Positive (Warm): Warmer SSTs near the U.S. West Coast and cooler SSTs in the central Pacific.
      - Negative (Cool): Cooler SSTs near the U.S. West Coast and warmer SSTs in the central Pacific.

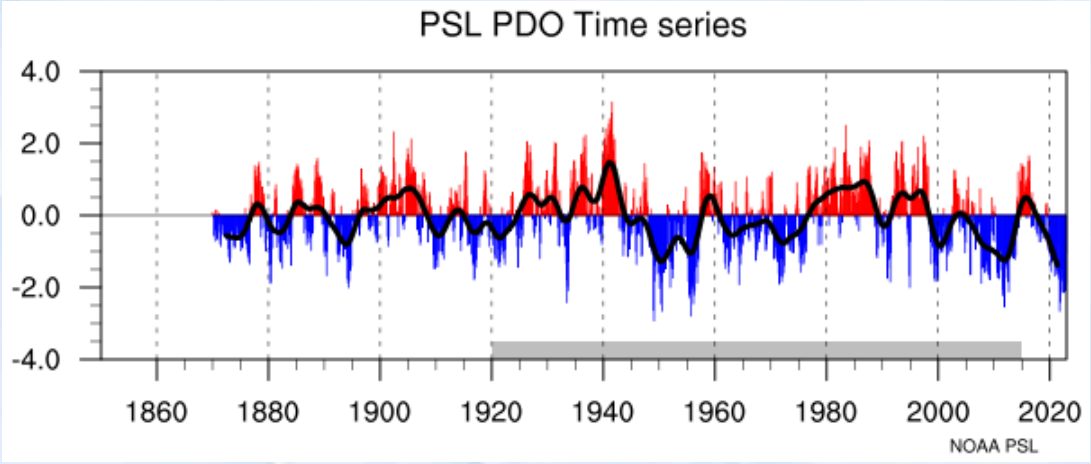


NOAA Physical Science Laboratory – Image Link: https://psl.noaa.gov/pdo/img/pdo_warm_cool3.jpg

Pacific Decadal Oscillation (PDO) 2024-2025

PDO's Importance in Winter

- **Forecasting:**
  - **Impacts on Jet Stream**:
    - **Positive PDO**: Strengthens and shifts the jet stream southward, bringing wetter, stormier winters to regions like California and the Pacific Northwest.
    - **Negative PDO**: Weakens or shifts the jet stream northward, leading to cooler, drier winters in the Pacific Northwest and potentially warmer conditions in the southern U.S.
- **Current Phase:**
  - The PDO is in a **negative (cool) phase** with a value of -3.54 (September 2024).
  - PDO is projected to remain negative through winter 2025.



NOAA Physical Science Laboratory – Image Link: https://psl.noaa.gov/pdo/img/pdo_warm_cool3.jpg

SOI and ONI Proxy Years and PDO- All Years

Let's find years with similar PDO in our SOI and ONI proxy years.

- PDO currently at -3.54 (September 2024).
- PDO is projected to remain negative through winter 2025.
- None of the SOI and ONI Proxy Years saw PDO that low for September.
  - The 3 years with the lowest PDO for September:
    - *1950-1951 = -2.40
    - 2008-2009 = -1.87
    - 2022-2023 = -2.29
      - These years also saw a negative PDO through the winter.

Month	*1950-1951	~~1964-1965~~	~~1971-1972~~	2008-2009	2022-2023
Sep	-2.40	~~-1.35~~	~~-0.17~~	-1.87	-2.29
Oct	-1.92	~~-0.64~~	~~-0.35~~	-1.90	-1.82
Nov	-1.45	~~-0.68~~	~~-1.28~~	-1.59	-2.41
Dec	-1.06	~~-0.62~~	~~-1.77~~	-1.31	-2.21
Jan	-1.19	~~-0.95~~	~~-2.12~~	-1.81	-1.25
Feb	-1.52	~~-0.61~~	~~-1.95~~	-1.78	-1.65
Mar	-1.72	~~-0.17~~	~~-1.53~~	-2.06	-2.45
Apr	-1.35	~~-0.01~~	~~-1.70~~	-2.23	-3.07

CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/pub/data/cmb/ersst/v5/index/ersst.v5.pdo.dat

*** Note: All five 3-month periods meet the initial ONI credentials.**

SOI, ONI, and PDO Proxy Years

All Years

Month	*1950-1951	2008-2009	2022-2023
Sep	-2.40	-1.87	-2.29
Oct	-1.92	-1.90	-1.82
Nov	-1.45	-1.59	-2.41
Dec	-1.06	-1.31	-2.21
Jan	-1.19	-1.81	-1.25
Feb	-1.52	-1.78	-1.65
Mar	-1.72	-2.06	-2.45
Apr	-1.35	-2.23	-3.07

CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/pub/data/cmb/ersst/v5/index/ersst.v5.pdo.dat

*** Note: All five 3-month periods meet the initial ONI credentials.**

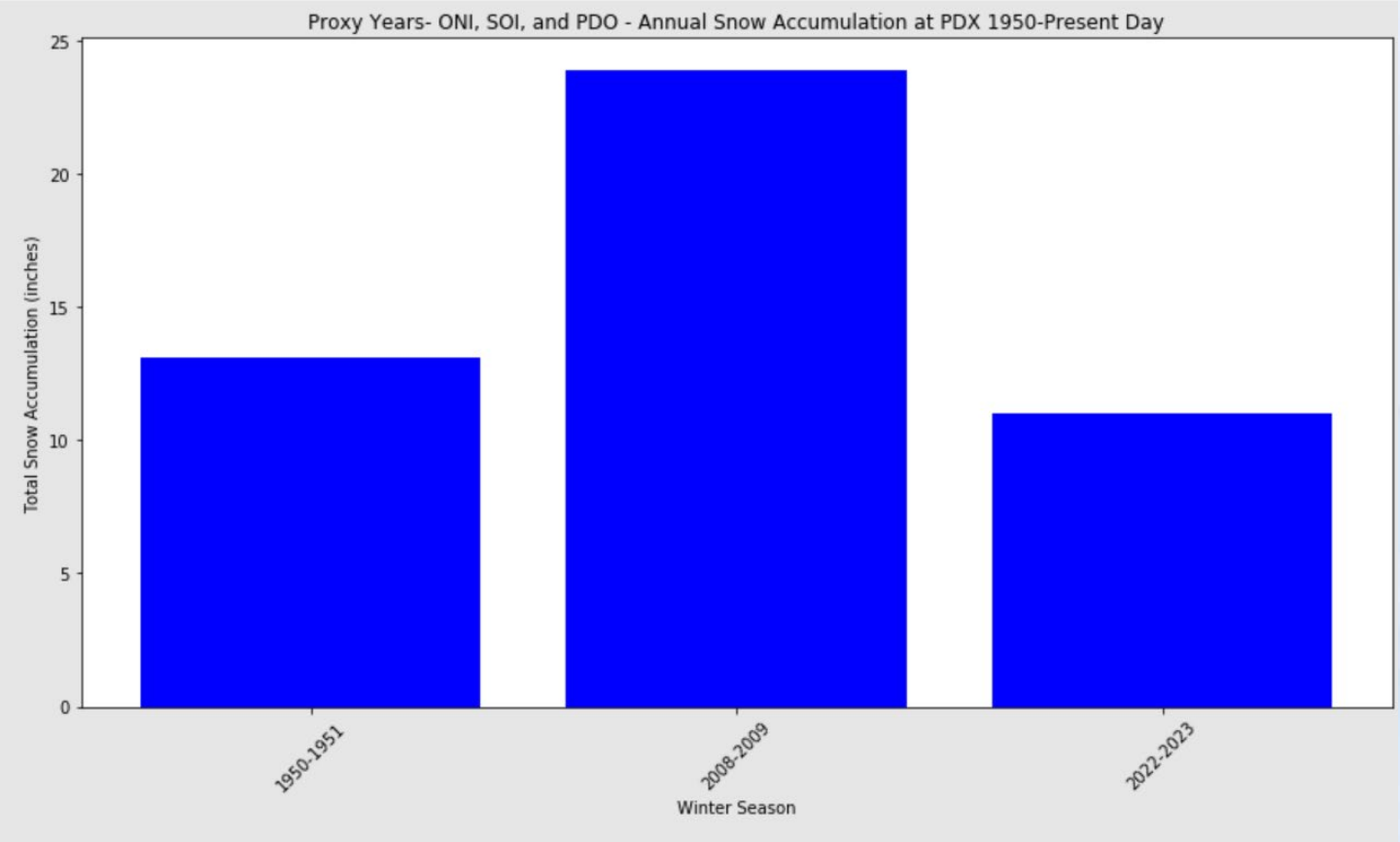
**Last 30 Years

Month	2008-2009	2022-2023
Sep	-1.87	-2.29
Oct	-1.90	-1.82
Nov	-1.59	-2.41
Dec	-1.31	-2.21
Jan	-1.81	-1.25
Feb	-1.78	-1.65
Mar	-2.06	-2.45
Apr	-2.23	-3.07

CSV Data from National Center for Environmental Information:
https://www.ncei.noaa.gov/pub/data/cmb/ersst/v5/index/ersst.v5.pdo.dat

****Note:** These are the same years analyzed in the SOI and ONI proxy years.

SOI, ONI, and PDO Proxy Years- All Years

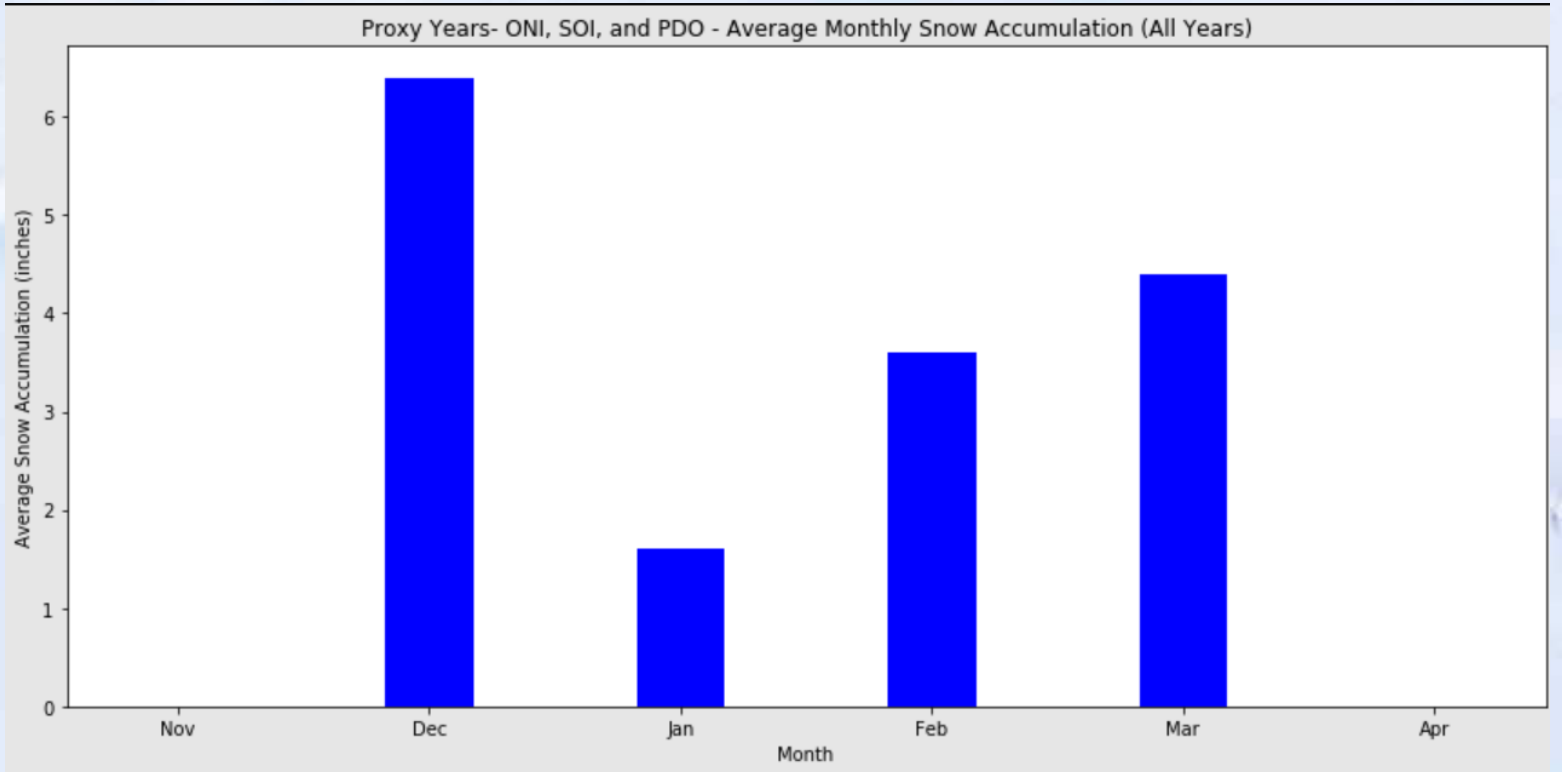


Winter Season	Total Snow Accumulation
*1950-1951	13.1”
2008-2009	23.9”
2022-2023	11.0”

CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

*** Note: All five 3-month periods meet the initial ONI credentials.**

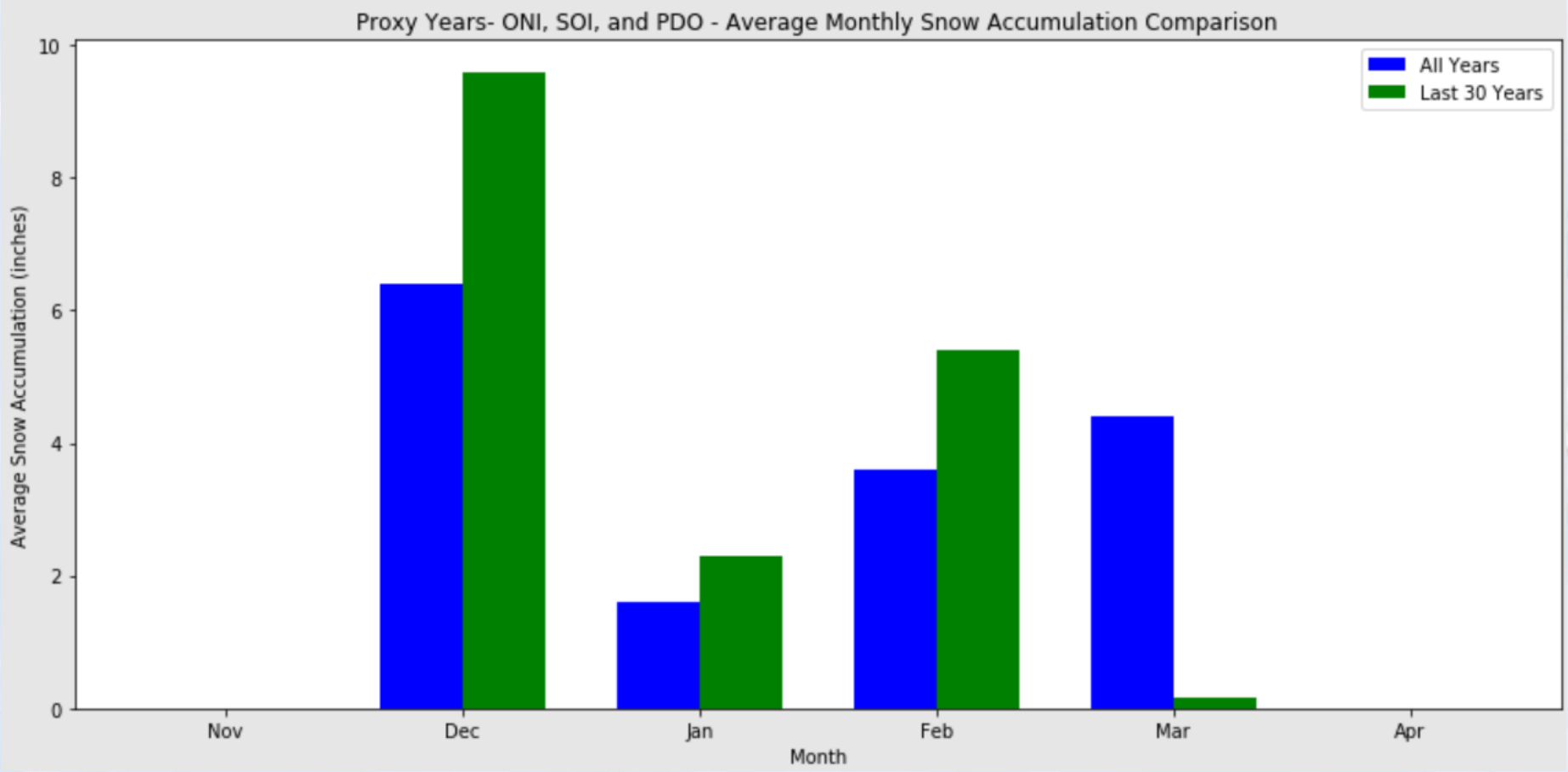
SOI, ONI, and PDO Proxy Years- All Years



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

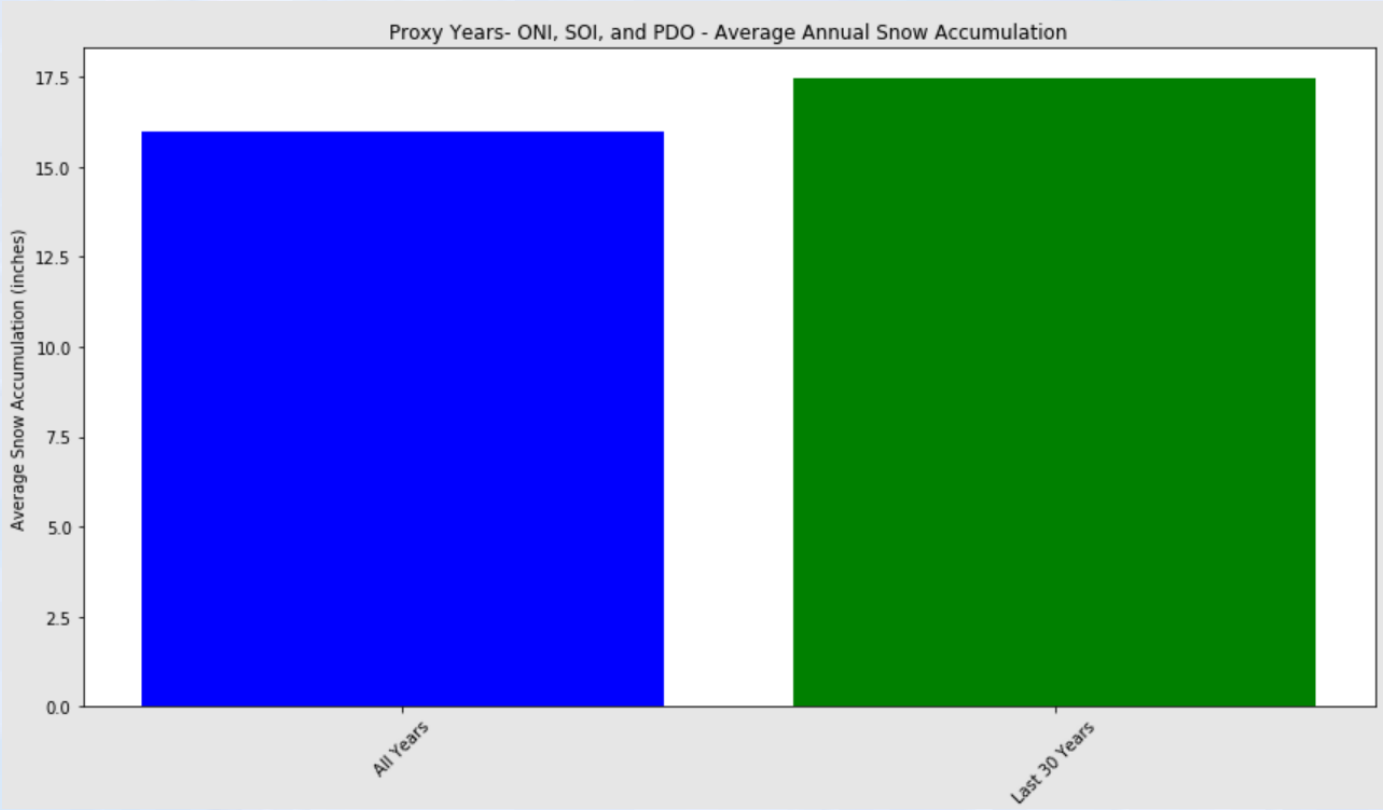
Month	Average Accumulation
November	0.00”
December	6.40”
January	1.60”
February	3.6”
March	4.4”
April	0.00”

SOI, ONI, and PDO Proxy Years



CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

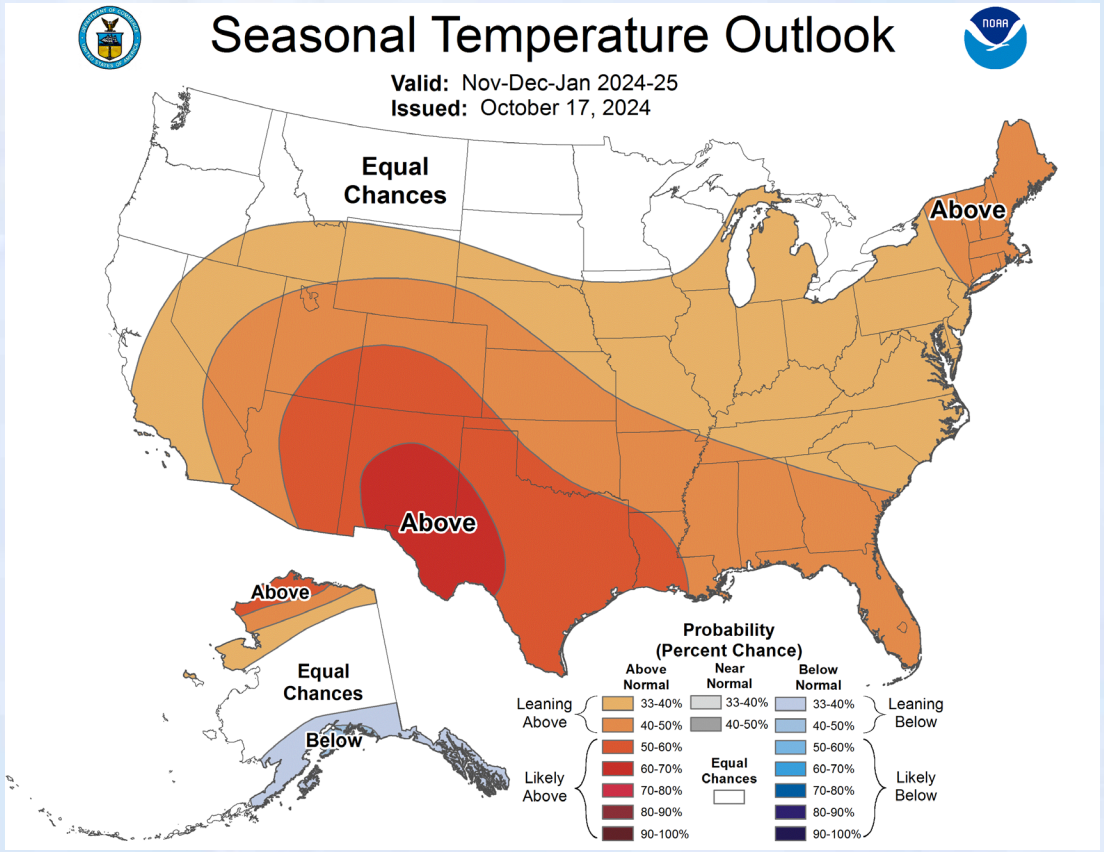
SOI, ONI, and PDO Proxy Years

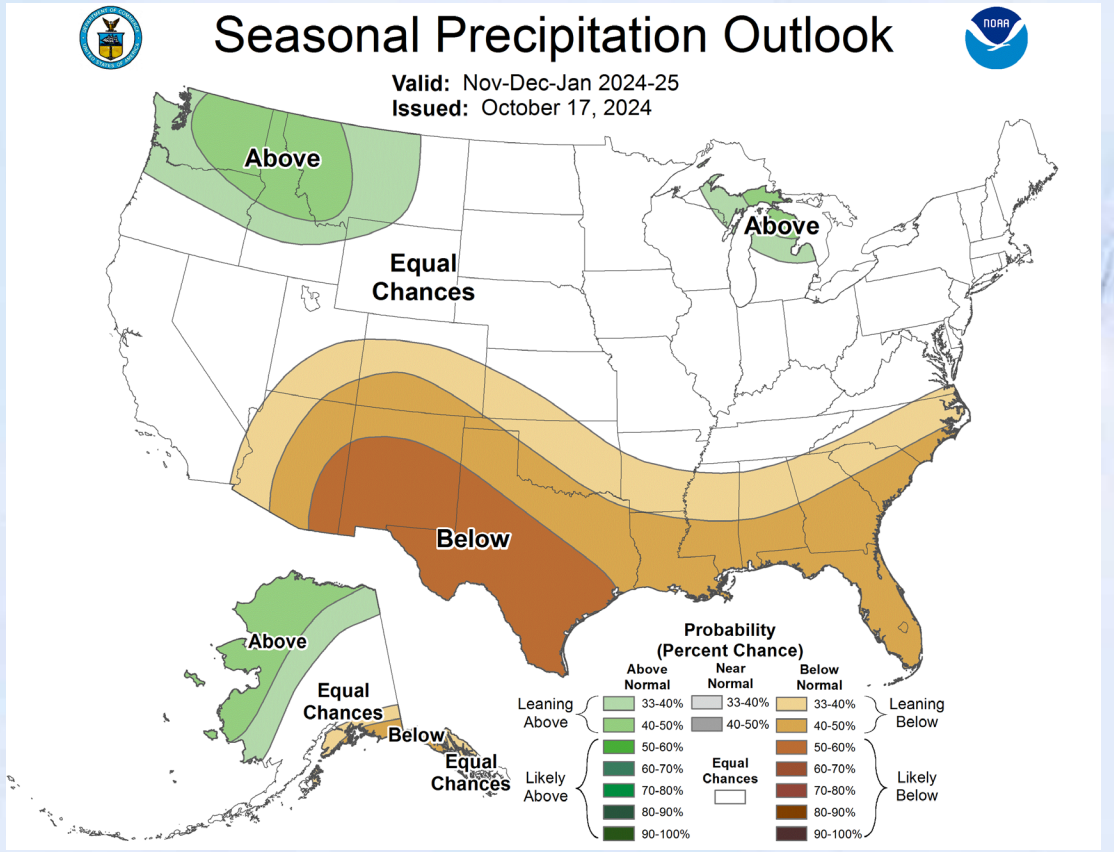


CSV Data from National Center for Environmental Information: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990

Periods	Average Annual Season Snow Accumulation
All Years	16.0”
Last 30 Years	17.45”

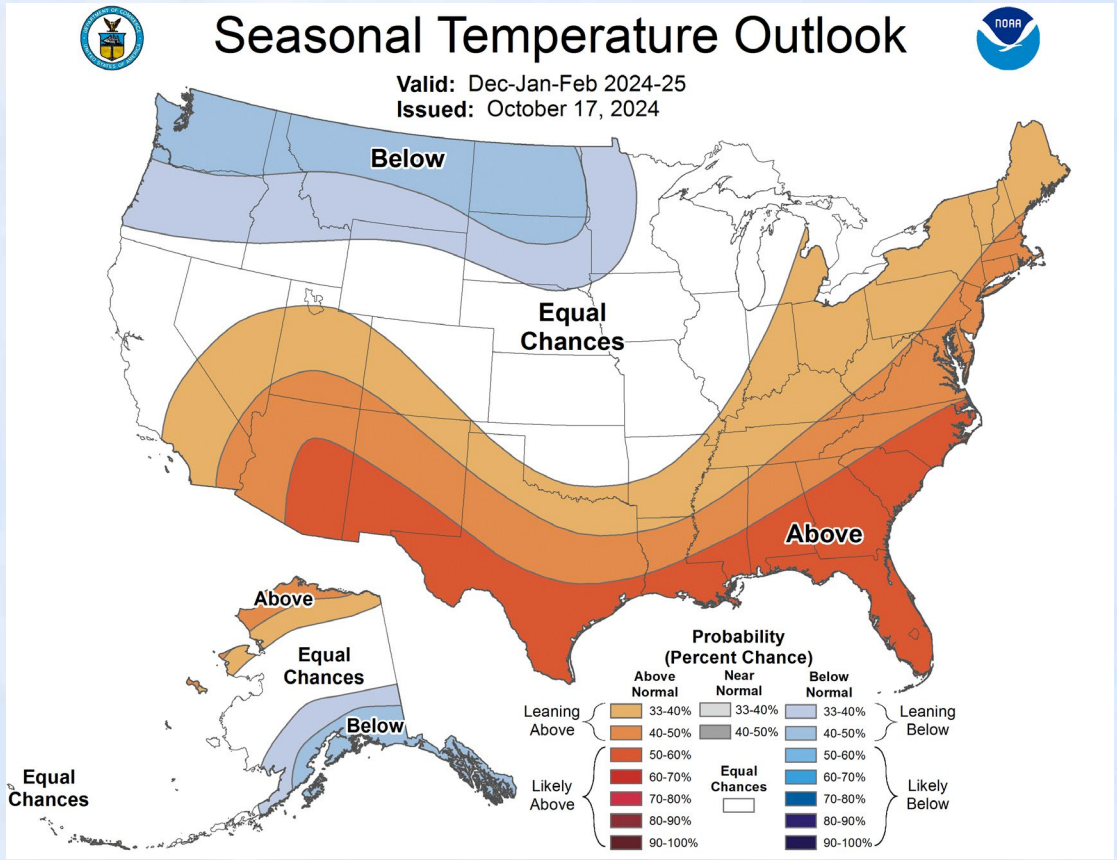
Climate Prediction Center 3-Month Outlook: Nov-Dec-Jan

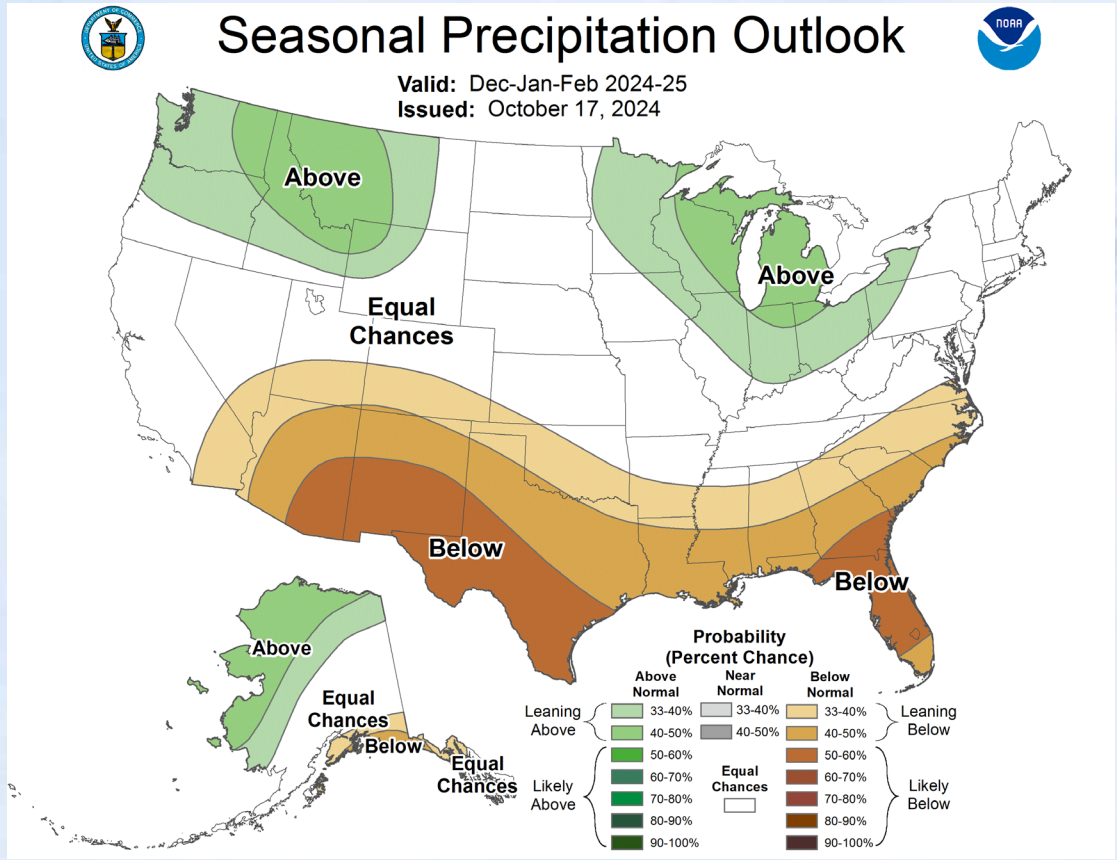




Climate Prediction Center Three Month Outlooks: https://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1

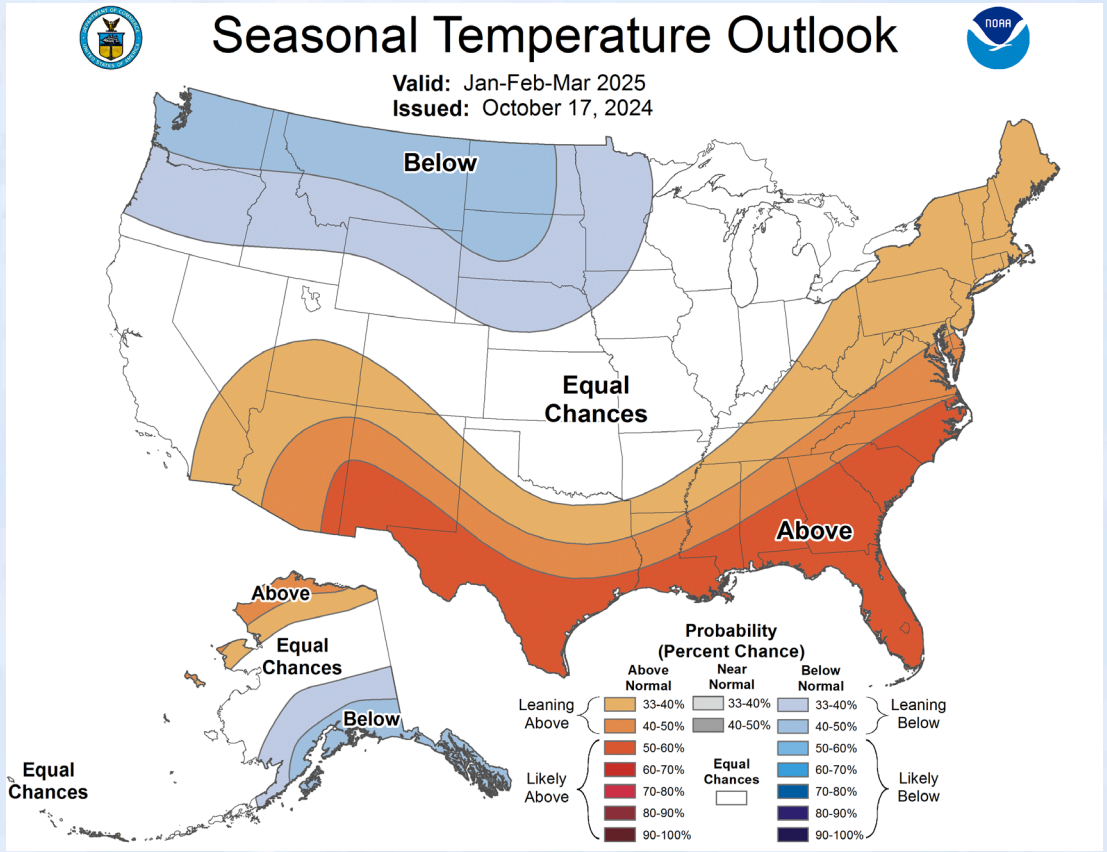
Climate Prediction Center 3-Month Outlook: Dec-Jan-Feb

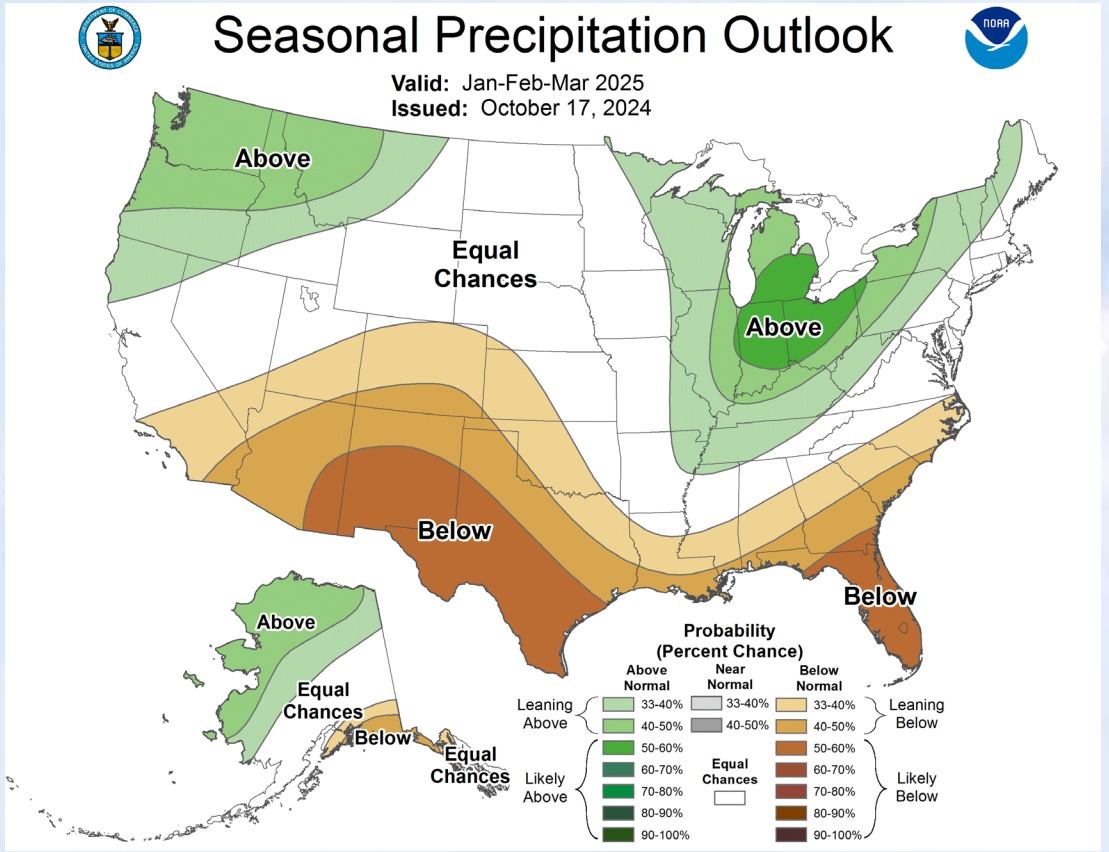




Climate Prediction Center Three Month Outlooks: https://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1

Climate Prediction Center 3-Month Outlook: Jan-Feb-Mar





Climate Prediction Center Three Month Outlooks: https://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1

Number Crunching Time

Let's do some math:

1.Weak La Nina Years Average
1. All years have a weight of 40%.
2. The last 30 years have a weight of 60%.

2.ONI Proxy Years Average.
1. All years have a weight of 40%.
2. Last 30 years have a weight of 60%.

3.SOI and ONI Proxy Years Average
1. All years have a weight of 40%.
2. Last 30 years have a weight of 60%.

4.PDO, SOI, and ONI Proxy Years Average.
1. All years have a weight of 40%.
2. Last 30 years have a wright of 60%.

5. Overall Weighted Average:
1. Proxy Year: 5%
    1. Since 1950-1951 met all the initial conditions, we will allow it to have a 5% weight in the overall average.
2. Weak La Nina Years Average: 10%
3. ONI Proxy Years Average: 15%
4. SOI and ONI Proxy Years Average: 30%
5. PDO, SOI, and ONI Proxy Years Average: 60%

Average Annual Snow Accumulation For Each Analysis

Periods	Average Annual Season Snow Accumulation
*Proxy Year (1950-1951)	13.1"
Weak La Niña All Years	6.47"
Weak La Niña Last 30 Years	6.98"
ONI Proxy Years-All Years	6.94"
ONI Proxy Years-Last 30 Years	8.75"
SOI and ONI Proxy Years-All Years	12.86"
SOI and ONI Proxy Years-Last 30 Years	17.45"
SOI, ONI, and PDO Proxy Years-All Years	16.0"
SOI, ONI, and PDO Proxy Years-Last 30 Years	17.45"

Weighted Average Annual Snow Accumulation For Each Analysis

Periods	Average Annual Season Snow Accumulation
Weak La Niña Average	6.73"
ONI Proxy Years Average	7.85"
SOI and ONI Proxy Years Average	15.16"
SOI, ONI, and PDO Proxy Years Average	16.73"
*Proxy Year (1950-1951)	13.1"
Overall Weighted Average	**13.69"**

*Note: Annual Snow Accumulation

PDX Winter Weather Forecast 2024-2025

Possible Winter Weather Events (Other than Snow):

- **Cold Snap:**
  - Chances are high that we'll experience cold snap (or serries of cold snaps).
    - **Timing:** December and January are the prime months, but a February cold snap remains possible.
- **Ice Event:**
  - An ice event is likely.
    - **Timing:** December and January hold the highest likelihood for this event. Still, early to mid-February remains in the cards for an ice occurrence.
- **High Wind Event:**
  - A high wind event possible late winter.
    - **Timing:** February to March.
      - I'm inclined to target the March time frame.
      - **Strong easterly event earlier in the season is possible (associated with a cold snap).

Image Source: cold-weather-winter-meme-960x960.jpeg (960×960) (digitalmomblog.com)

PDX Winter Weather Forecast 2024-2025

Snow Forecast:

- **Snowstorm:**
  - Chances are **high** that we'll experience a snowstorm this winter.
    - Looking at our proxy years:
      - 10/15 Weak La Niña years analyzed had notable snowstorms in Portland.
        - 7/8 years that fell in the last 30 years had notable snowstorms .
      - 6/10 ONI Proxy Years analyzed had notable snowstorms in Portland.
        - 4/4 years that fell in the last 30 years had notable snowstorms.
      - 3/5 SOI and ONI Proxy Years analyzed had notable snowstorms in Portland.
        - 2/2 years that fell in the last 30 years had notable snowstorms.
      - 3/3 (All) SOI, ONI, and PDO Proxy Years analyzed had notable snowstorms in Portland.
        - 2/2 years that fell in the last 30 years had notable snowstorms.
      - 1950-1951: March 3-10, 1951 (late season) (12.9”).
  - **Timing:** January to February hold the highest likelihood, but a snowstorm in December is also quite probable

Image Source: let-it-snow-meme-960x960.jpeg (960×960) (digitalmomblog.com)

Seasonal Snow Accumulation Forecast for PDX:
7”-17” (leaning in the middle of this range).

THANK YOU FOR YOUR TIME

Meme Source: https://www.oregonlive.com/resizer/SQHB2rGQRCa7Qv2KkS3YPiOe8=/1280x0/smart/advancelocal-adapter-image-uploads.s3.amazonaws.com/image.oregonlive.com/home/olive-media/width2048/img/trendingphoto/2017/03/15/snow.jpg

Bibliography

1. iStockphoto. (n.d.). City snow xxl [Image]. Retrieved from https://media.istockphoto.com/photos/city-snow-xxl-picture-id173592608?k=6&m=173592608&s=612x612&w=0&h=dejwXIM7Qp7SPkA4-KATRuJ1Nh2nMq1TwokNN9WWivo=

2. International Research Institute for Climate and Society. 2024. ENSO Sea Surface Temperature Table. Columbia University. [Available online at: https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-sst_table]. Accessed 13 Oct. 2024.

3. Climate Prediction Center, National Oceanic and Atmospheric Administration (NOAA). 2024. Oceanic Niño Index (ONI). [Available online at: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php]. Accessed 13 Oct. 2024.

4. National Centers for Environmental Information (NCEI), NOAA. 2024. CSV Data. [Available online at: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3103990]. Accessed 13 Oct. 2024.

5. Physical Sciences Laboratory, NOAA. 2024. Pacific Decadal Oscillation (PDO) Index. [Available online at: https://psl.noaa.gov/pdo/]. Accessed 13 Oct. 2024.

6. National Centers for Environmental Information (NCEI), NOAA. 2024. Extended Reconstructed Sea Surface Temperature (ERSST) v5 PDO Data. [Available online at: https://www.ncei.noaa.gov/pub/data/cmb/ersst/v5/index/ersst.v5.pdo.dat]. Accessed 13 Oct. 2024.

7. Climate Prediction Center, National Oceanic and Atmospheric Administration (NOAA). 2024. Long Range Seasonal Predictions. [Available online at: https://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1]. Accessed 13 Oct. 2024.

8. National Centers for Environmental Information (NCEI), NOAA. 2024. CSV Data. [Available online at: https://www.ncei.noaa.gov/cdo-web/orders?email=avogt1101@gmail.com&id=3815357]. Accessed 13 Oct. 2024.

9. Australian Government Bureau of Meteorology. 2024. Southern Oscillation Index (SOI) History. [Available online at: http://www.bom.gov.au/climate/current/soihtm1.shtml]. Accessed 13 Oct. 2024.

10. NOAA Physical Science Laboratory. 2024. Image of PDO Warm and Cool Phases. [Available online at: https://psl.noaa.gov/pdo/img/pdo_warm_cool3.jpg]. Accessed 13 Oct. 2024.

11. Digital Mom Blog. 2024. Let It Snow Meme. [Available online at: https://digitalmomblog.com/let-it-snow-meme-960x960.jpeg]. Accessed 13 Oct. 2024.

12. The Oregonian. 2024. Image of Snow in Oregon. [Available online at: https://www.oregonlive.com/resizer/SQhB2rGG9tCa7Qn2Kt5j3YPiOp8=/1280x0/smart/advancelocal-adapter-image-uploads.s3.amazonaws.com/image.oregonlive.com/home/olive-media/width2048/img/trending/photo/2017/03/15/snow.jpg]. Accessed 13 Oct. 2024.

13. Pinterest. 2024. Snow Image. [Available online at: https://i.pinimg.com/originals/c4/52/dc/c452dc70ad49a3ec9c54ab08ad64caad.png]. Accessed 13 Oct. 2024.

14. Digital Mom Blog. (2022). Cold weather winter meme [Image]. Retrieved from [https://www.digitalmomblog.com/wp-content/uploads/2022/12/cold-weather-winter-meme-960x960.jpeg]