Fertilizer Projection Options

Analysis from Isabella Bertani

FEG

6/5/2023

Projection Options

- Use the percent change in fertilizer for the **states with data**.
- Continue to use the **last year** of data.
- Use a state-specific **trends** using the last 5 years of available data.

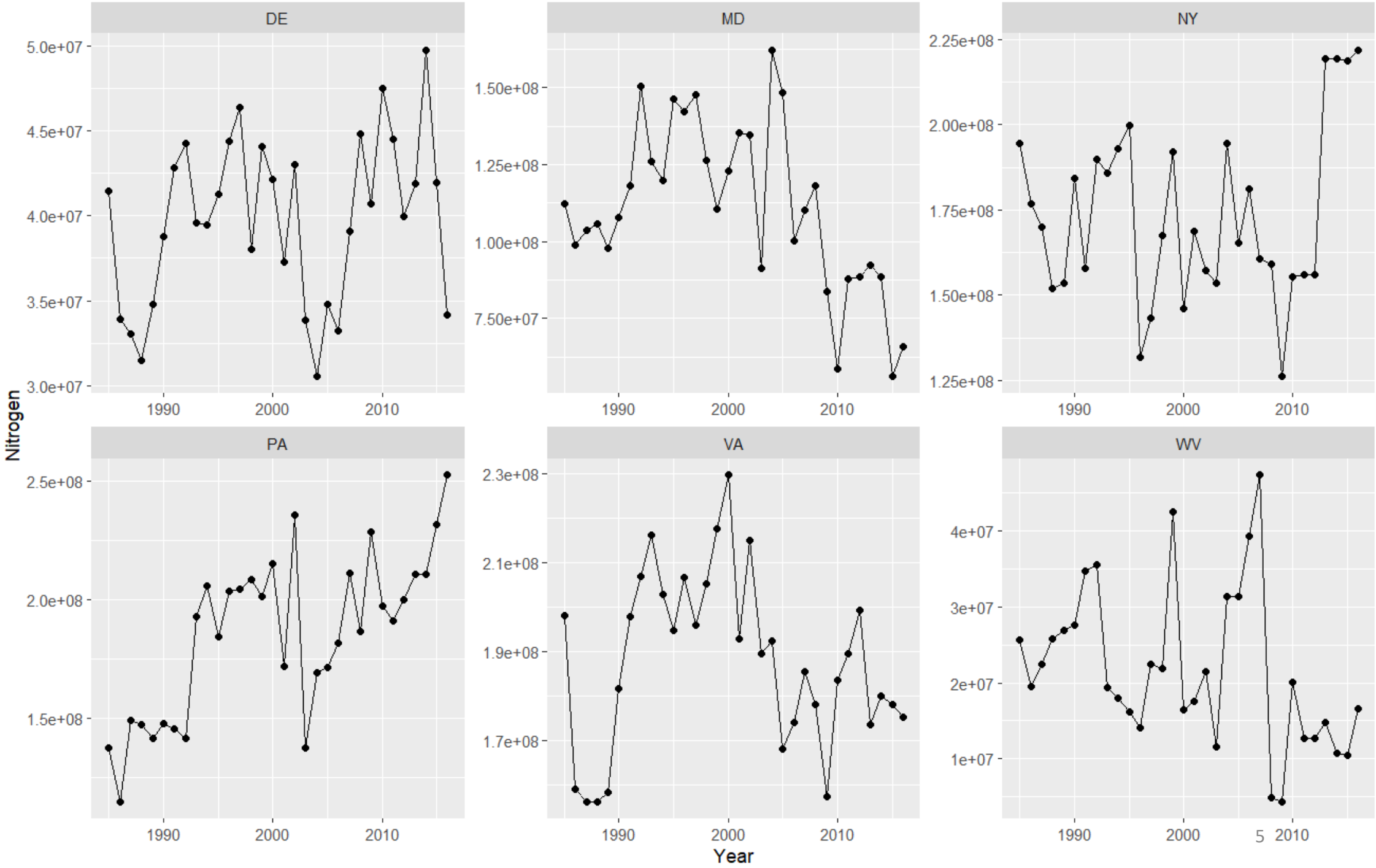
Evaluation Strategy

- Employ a statistician – Isabella Bertani
- Test each method using the existing years of AAPFCO data

Projection Options

- Use the percent change in fertilizer for the **states with data**.
  - *If states follow each other through time.*
- Continue to use the **last year** of data.
  - *If changes are random with no trend*
- Use a state-specific **trends** using the last 5 years of available data.
  - *If states are on their own path*

Nitrogen

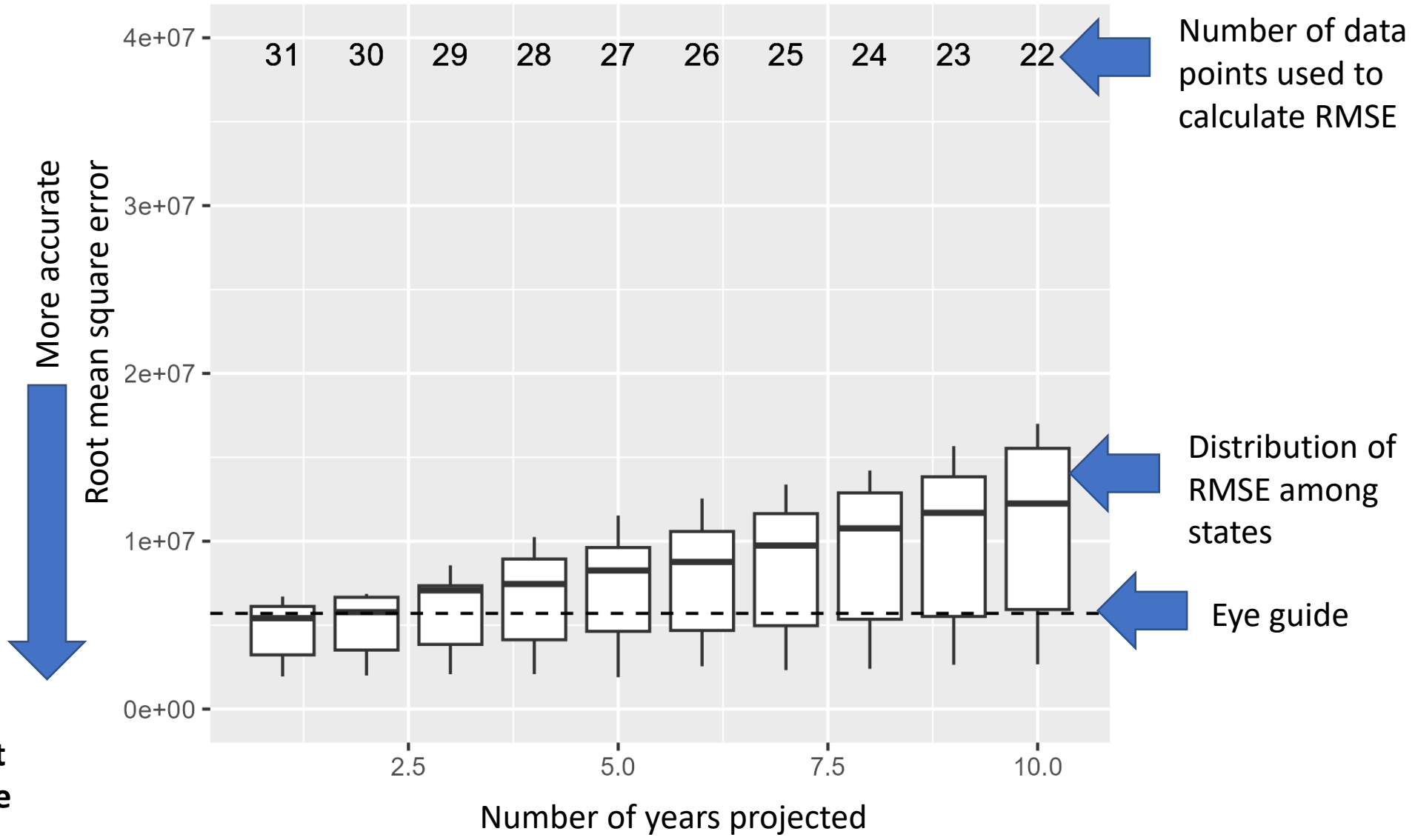

DE
MD
NY
PA
VA
WV
Nitrogen
Year
5.0e+07
4.5e+07
4.0e+07
3.5e+07
3.0e+07
1.50e+08
1.25e+08
1.00e+08
7.50e+07
2.25e+08
2.00e+08
1.75e+08
1.50e+08
1.25e+08
2.5e+08
2.0e+08
1.5e+08
2.3e+08
2.1e+08
1.9e+08
1.7e+08
4e+07
3e+07
2e+07
1e+07
1990
2000
2010

Phosphorus


DE
MD
NY
PA
VA
WV
Phosphorus
Year
1990
2000
2010
8e+06
6e+06
4e+06
2e+06
3e+07
2e+07
1e+07
6e+07
5e+07
4e+07
7e+07
12500000
10000000
7500000
5000000
2500000

Results

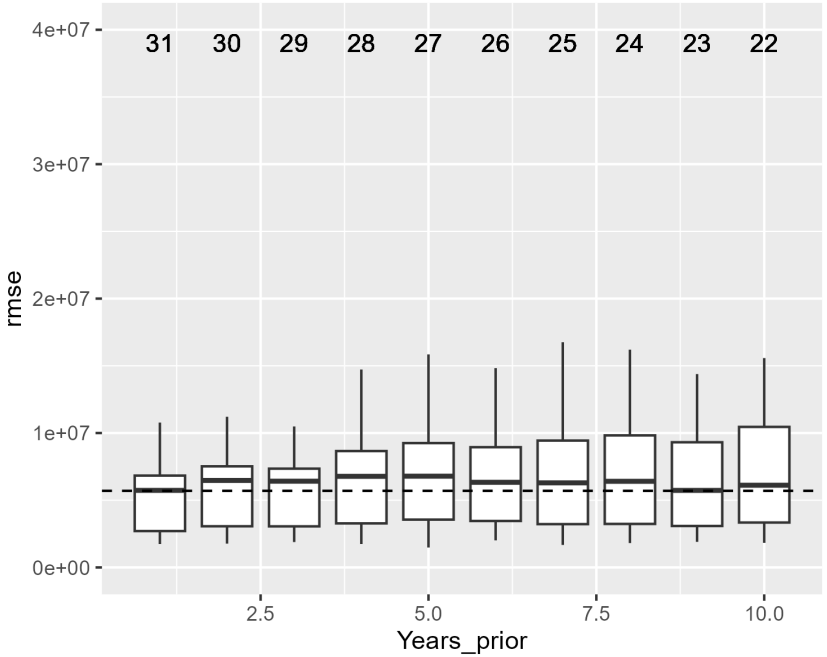
Phosphorus
Repeat latest year



Interpretation: using the last year results in steadily worse projections

Phosphorus

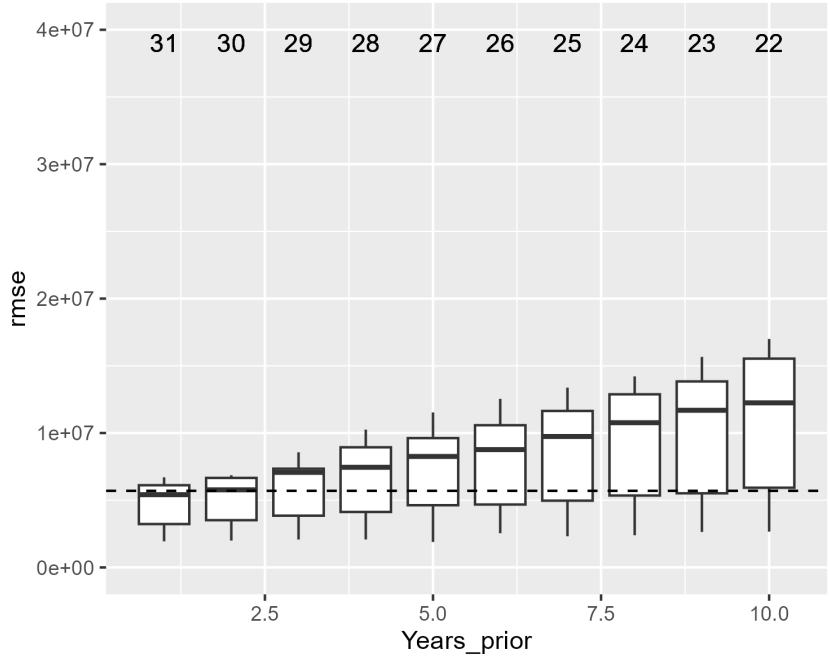
Use states with data



Can project into the future without loss of accuracy

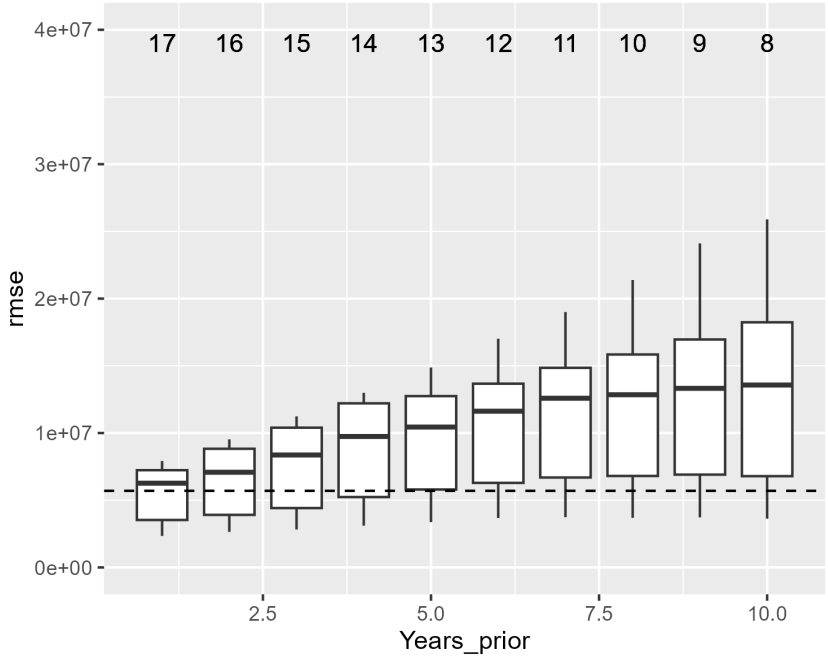
Best method

Repeat latest year



Progressively worse projections

State-specific trend 15-year trends



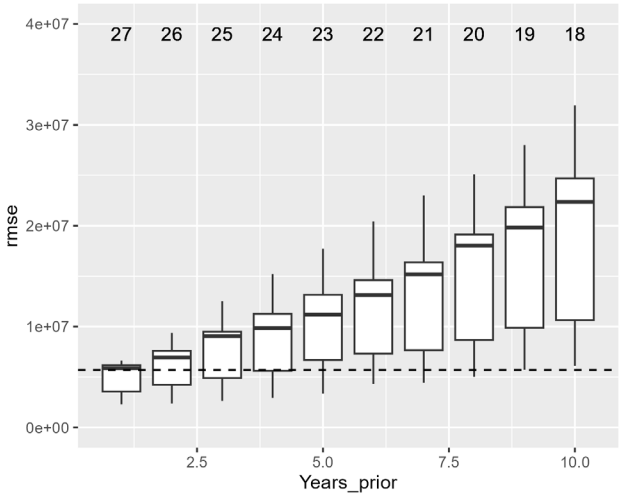
Progressively worse projections

Slightly worse than ‘repeat latest year’

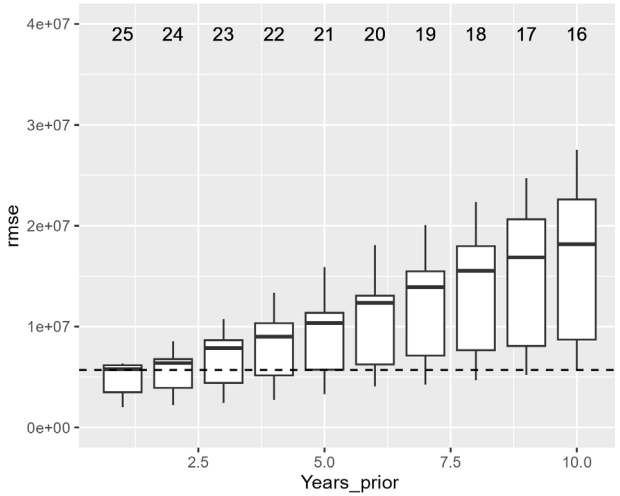
Year 1 is about the same no matter what method we use

Phosphorus

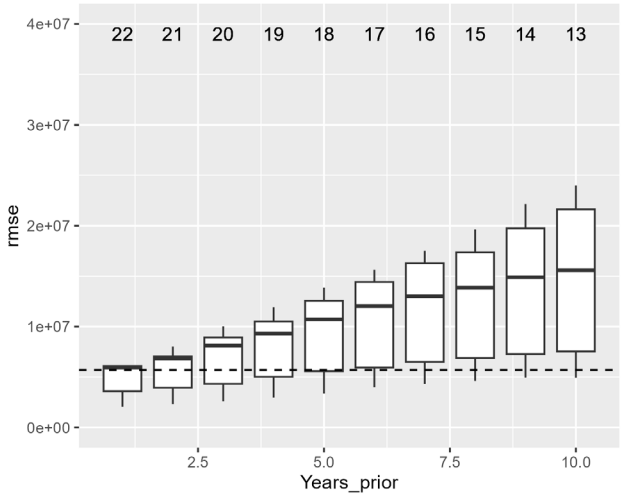
5-yr regression



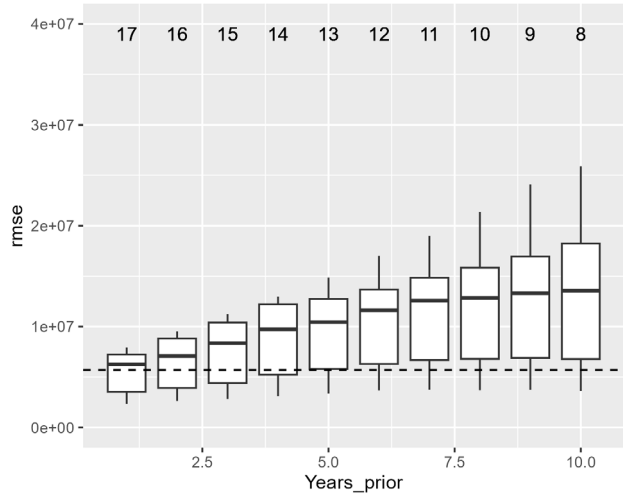
7-yr regression



10-yr regression



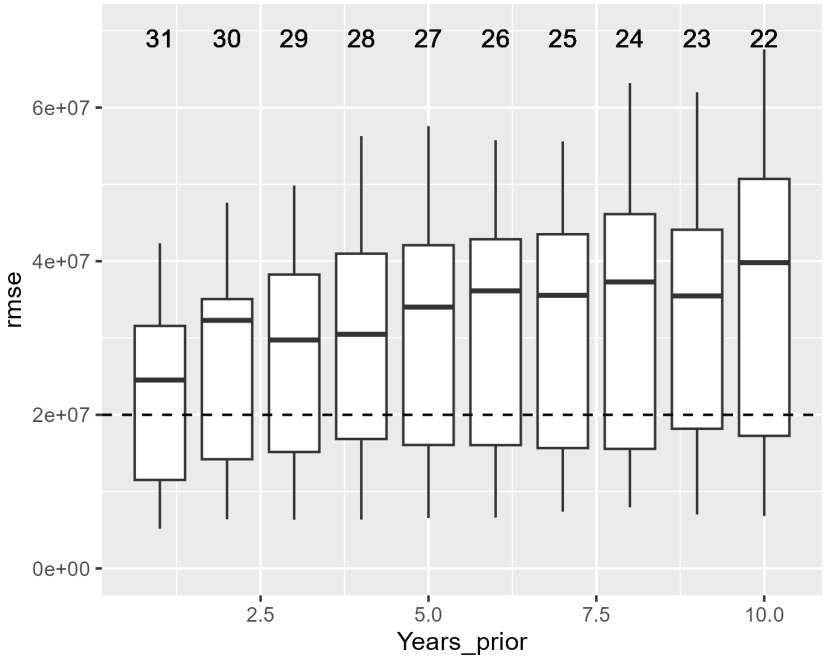
15-yr regression



15-year regressions are the most accurate

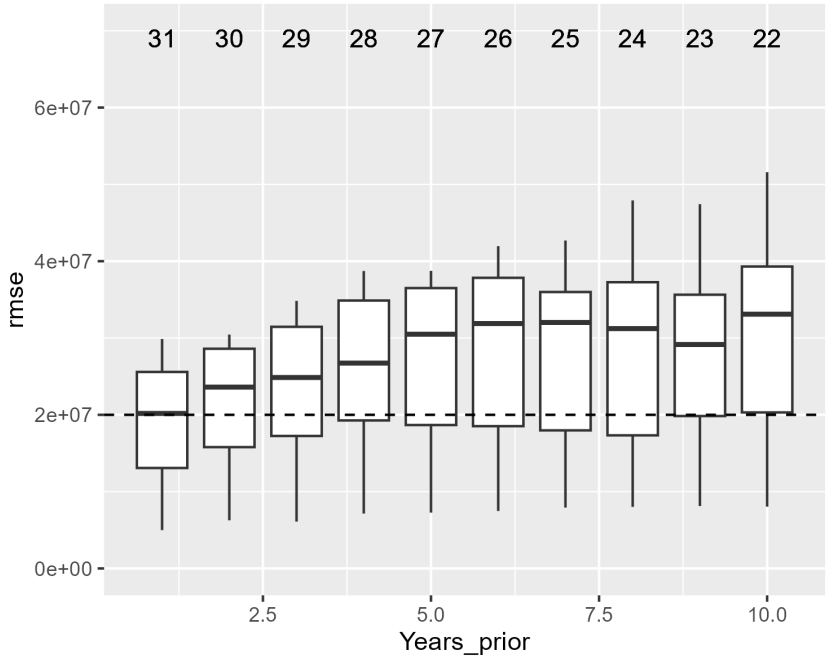
Nitrogen

Use states with data



Not too much worse

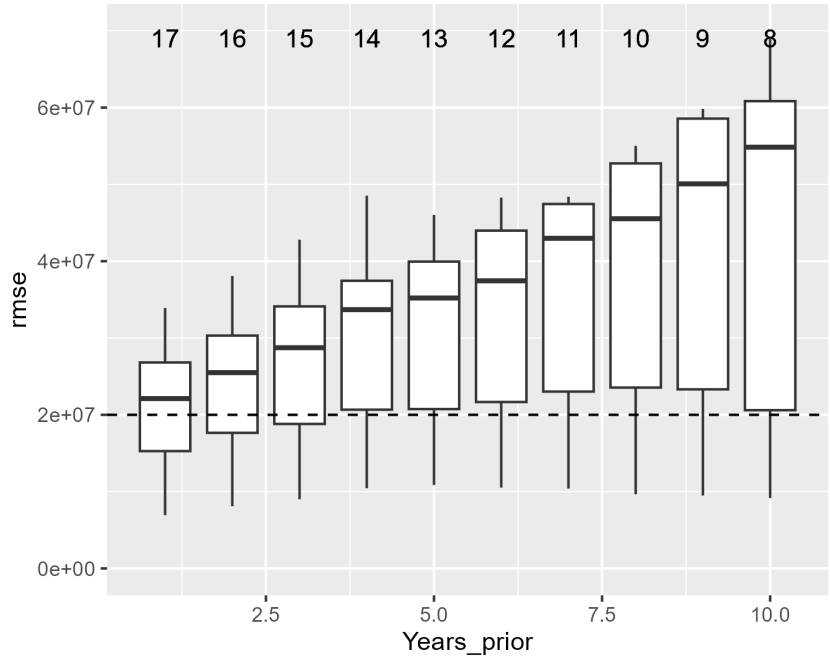
Repeat latest year



Generally the best and does not degrade after about 5 years

State-specific trend

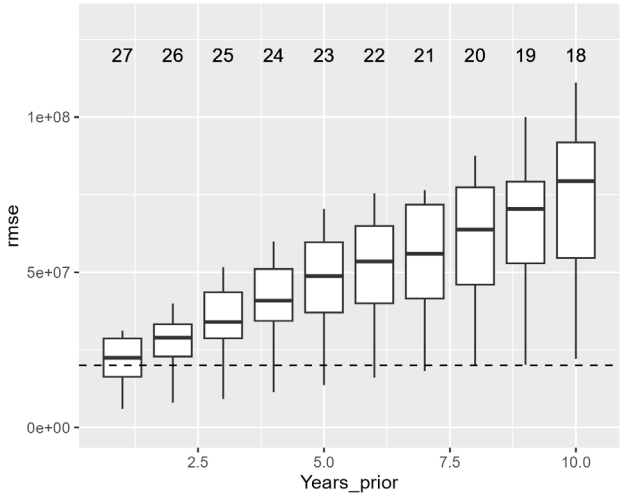
15-year trends



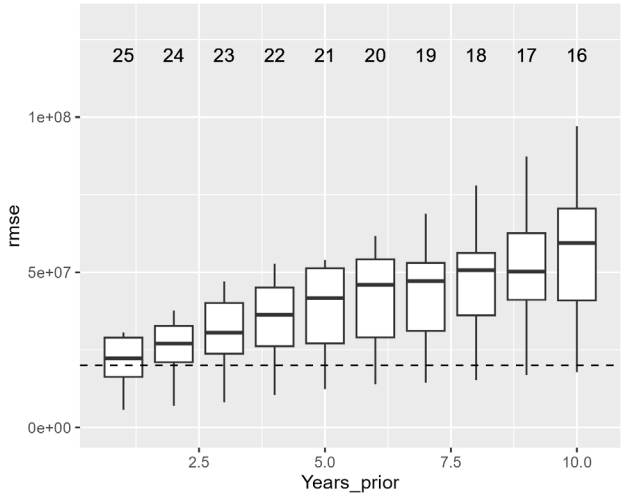
Progressively worse projections

Nitrogen

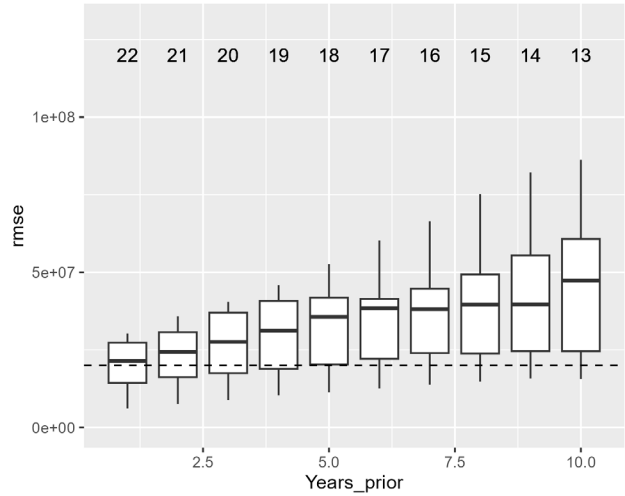
5-yr regression



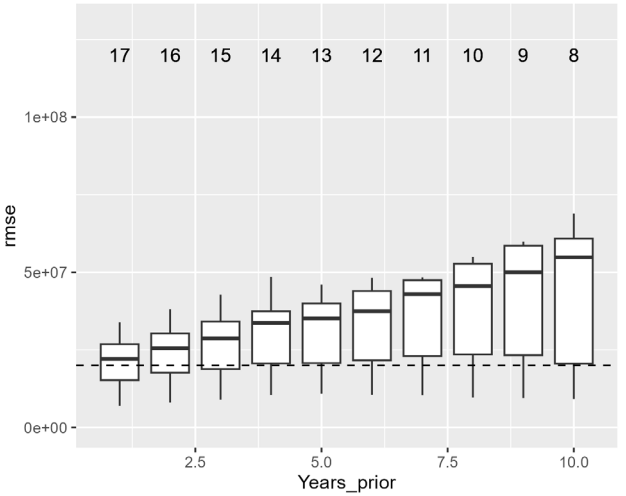
7-yr regression



10-yr regression



15-yr regression



10-15-year regressions are the most accurate

Findings

- Use the percent change in fertilizer for the **states with data**.
  - *Best for P, OK for N*
- Continue to use the **last year** of data.
  - *Best for N, not as good for P*
- Use a state-specific **trends**.
  - *Consistently the worst predictor*

Recommendation

- *For P*, Use the percent change in fertilizer for the **states with data**.
- *For N,*
  - Use the percent change in fertilizer for the **states with data?**
    - Consistent with P
    - Would catch any large trends that occur
  - Continue to use the **last year** of data?
    - Lowest error historically
    - Most consistent through time