Results using FT-NIRS for ageing the Rougheye/Blackspotted Rockfish complex off the contiguous U.S. West Coast
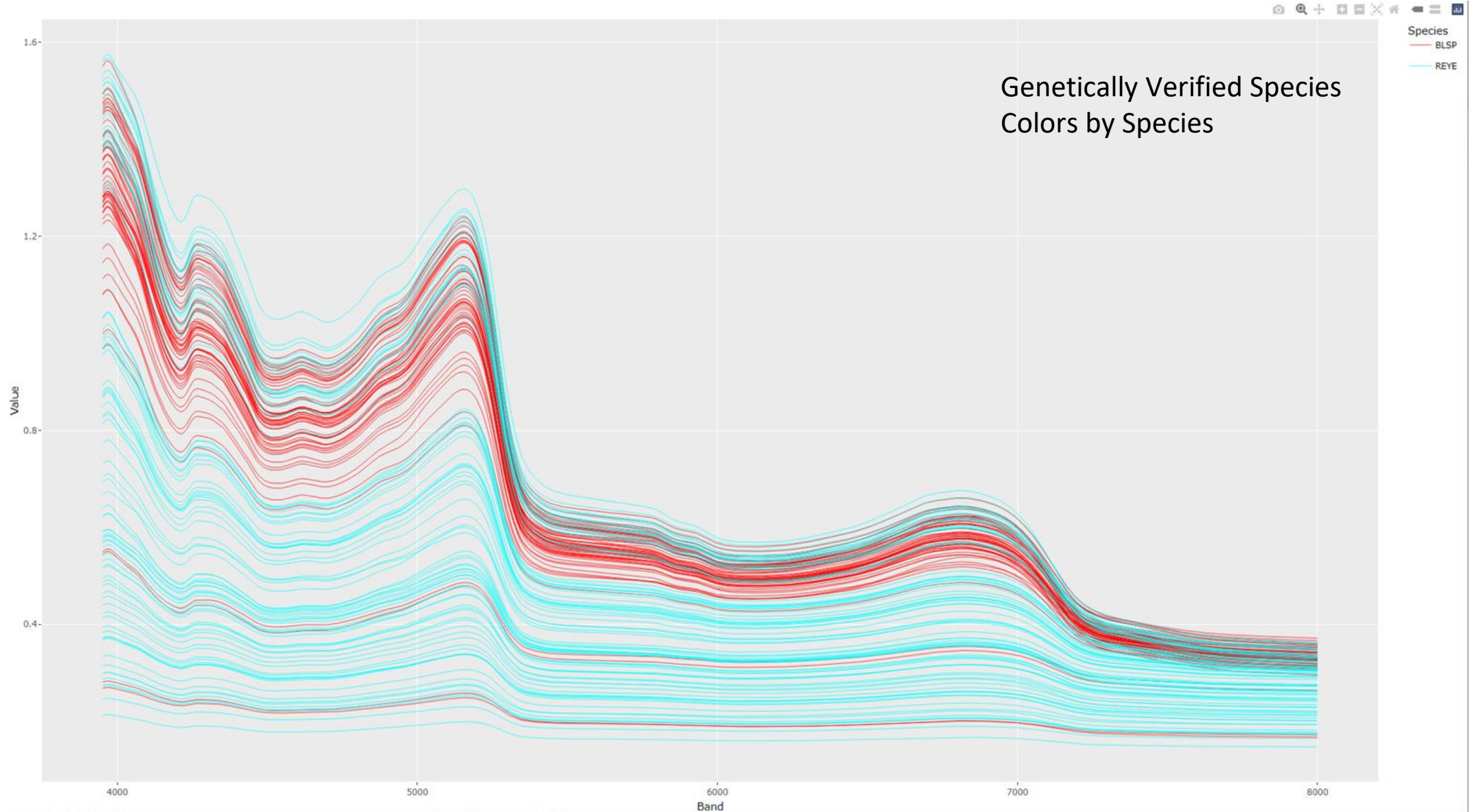
John R. Wallace

NWFSC - Seattle

Rougheye/Blackspotted Rockfish

Rougheye/Blackspotted Complex, WCGBTS Survey Data

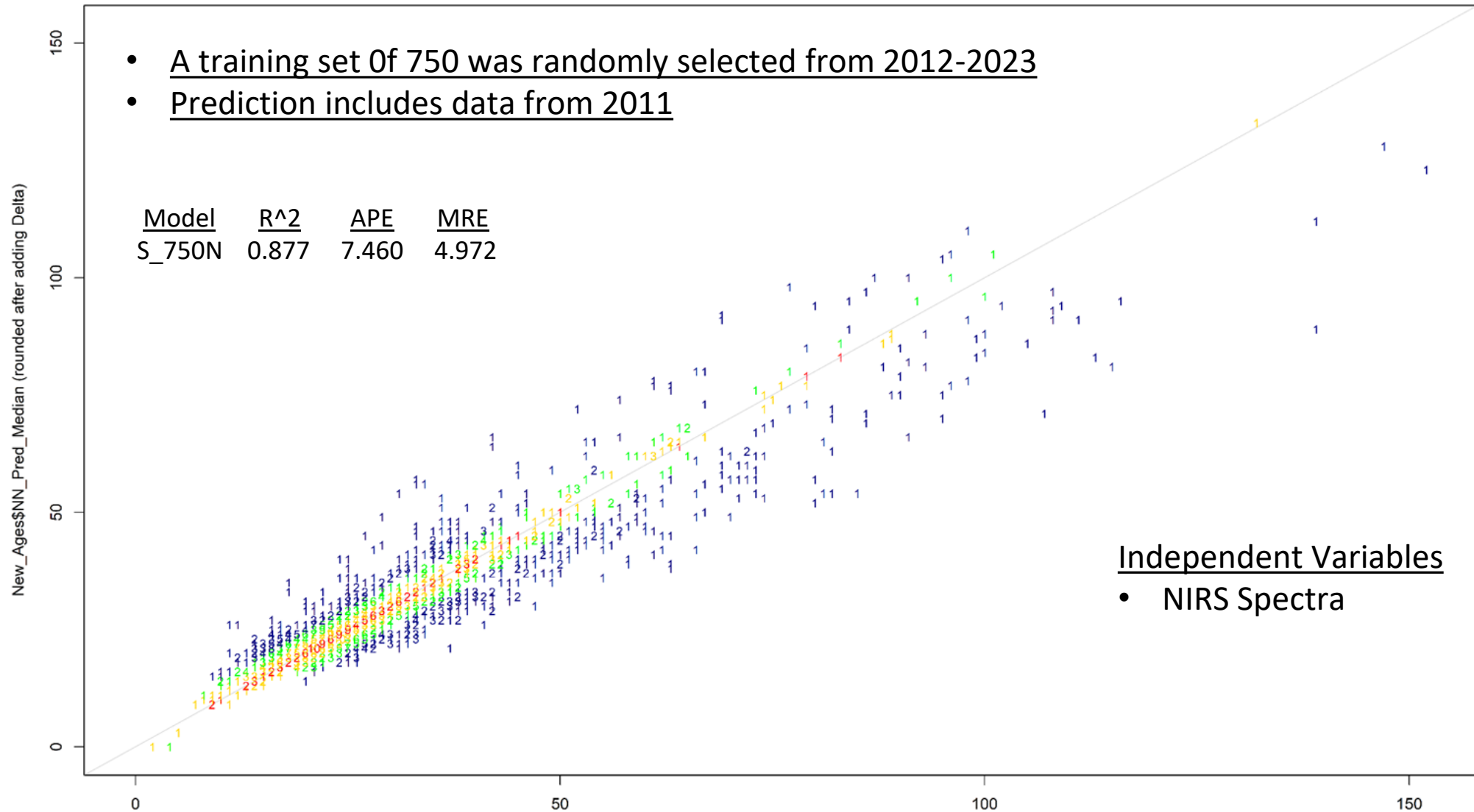Genetically Verified Species
Colors by Species

Rougheye/Blackspotted Complex, Commercial Data

Training N = 750; Random Reps = 20; Folds = 10; Delta = -0.05

- A training set 0f 750 was randomly selected from 2012-2023
- Prediction includes data from 2011

Model	R^2	APE	MRE
S_750N	0.877	7.460	4.972

Independent Variables
- NIRS Spectra

New_Ages$TMA: R^2 = 0.8769; RMSE = 7.1230; SAD = 6782; APE = 7.46; N_Pred = 1364 (Prediction rounded after adding Delta for Stats)

Rougheye/Blackspotted Complex, Commercial Data

Training N = 750; Random Reps = 20; Folds = 10; Delta = -0.05

Zoomed In

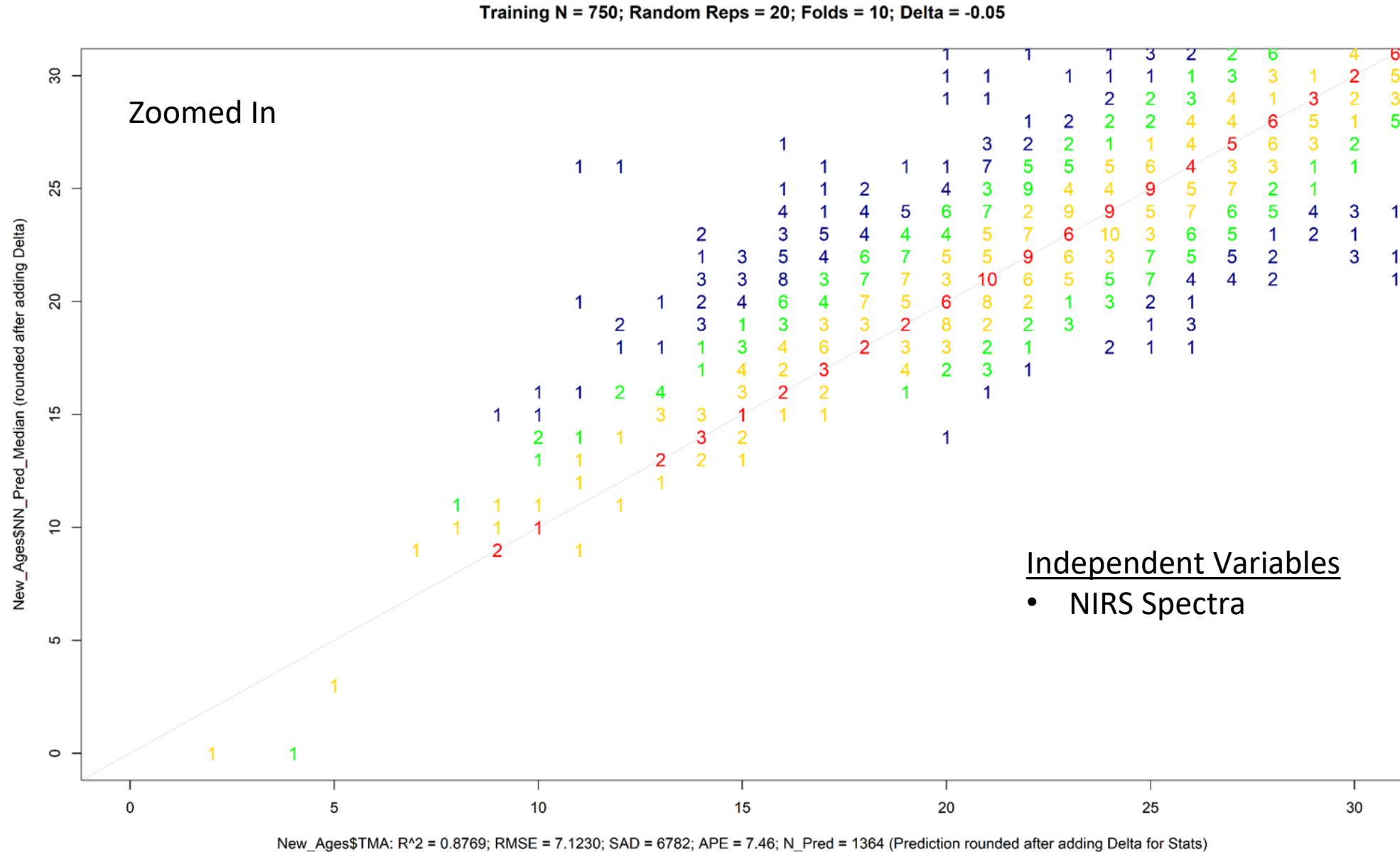New_Ages$NN_Pred_Median (rounded after adding Delta)
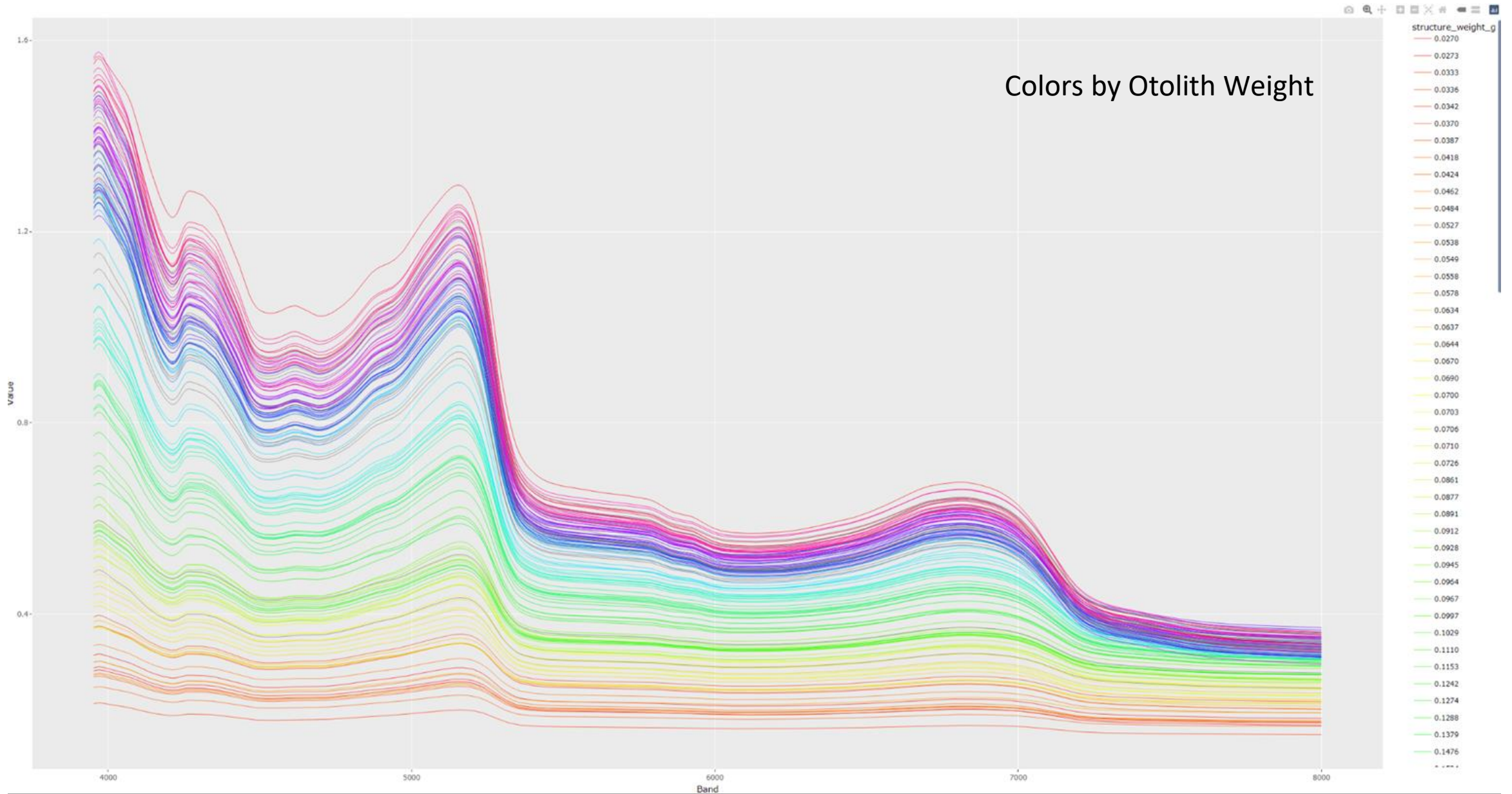
Independent Variables
- NIRS Spectra

New_Ages$TMA: R^2 = 0.8769; RMSE = 7.1230; SAD = 6782; APE = 7.46; N_Pred = 1364 (Prediction rounded after adding Delta for Stats)

Rougheye/Blackspotted Complex, WCGBTS Survey Data
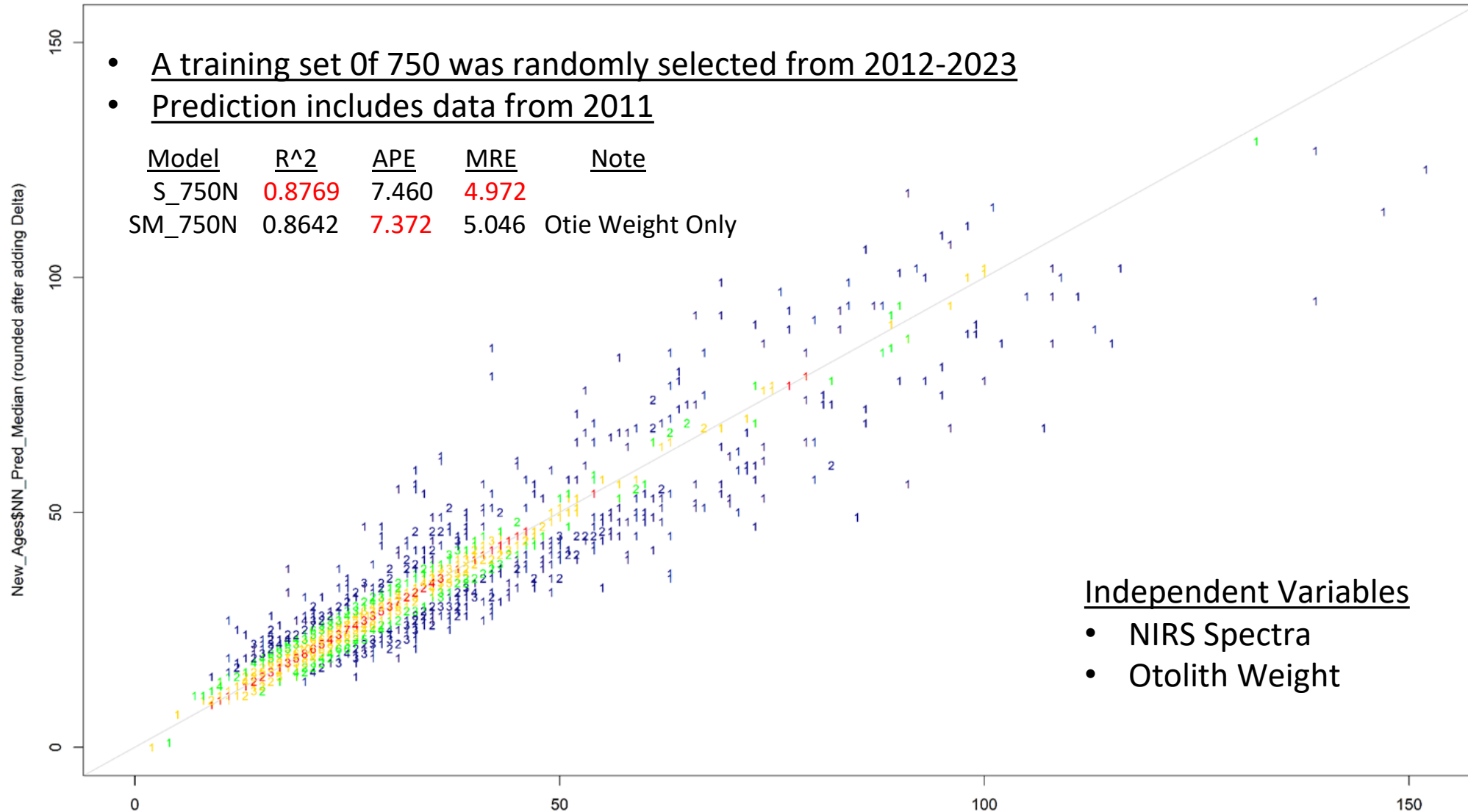

Colors by Otolith Weight

Rougheye/Blackspotted Complex, Commercial Data

Training N = 750; Random Reps = 20; Folds = 10; Delta = -0.45

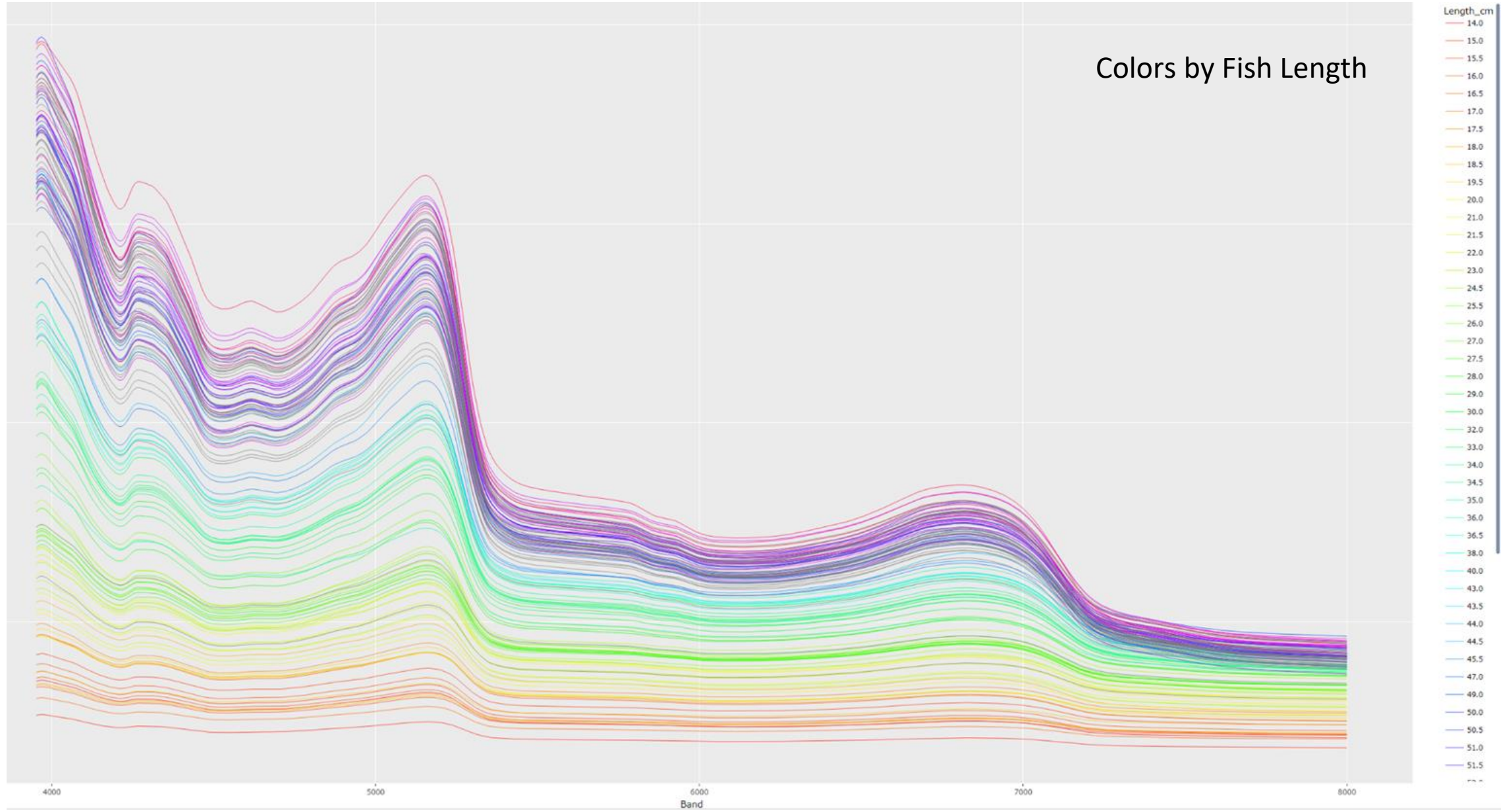- A training set 0f 750 was randomly selected from 2012-2023
- Prediction includes data from 2011

Model	R^2	APE	MRE	Note
S_750N	0.8769	7.460	4.972	
SM_750N	0.8642	7.372	5.046	Otie Weight Only

Independent Variables
- NIRS Spectra
- Otolith Weight

New_Ages$TMA: R^2 = 0.8642; RMSE = 7.3980; SAD = 6863; APE = 7.372; N_Pred = 1360 (Prediction rounded after adding Delta for Stats)

Rougheye/Blackspotted Complex, WCGBTS Survey Data
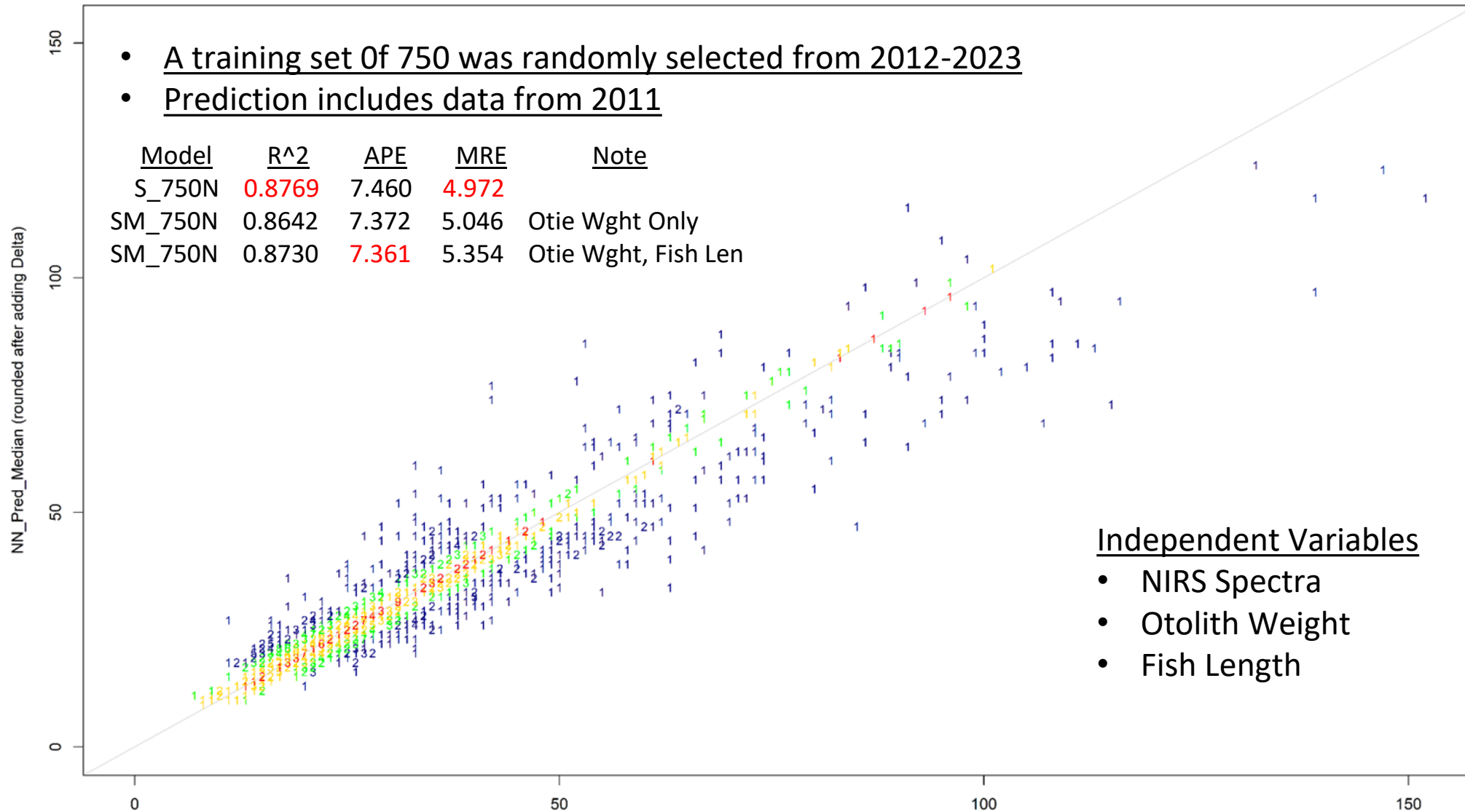
Colors by Fish Length

Rough Eye/Black Spotted Complex, Commercial Data

Training N = 750; Random Reps = 20; Folds = 10; Delta = -0.45

- A training set 0f 750 was randomly selected from 2012-2023
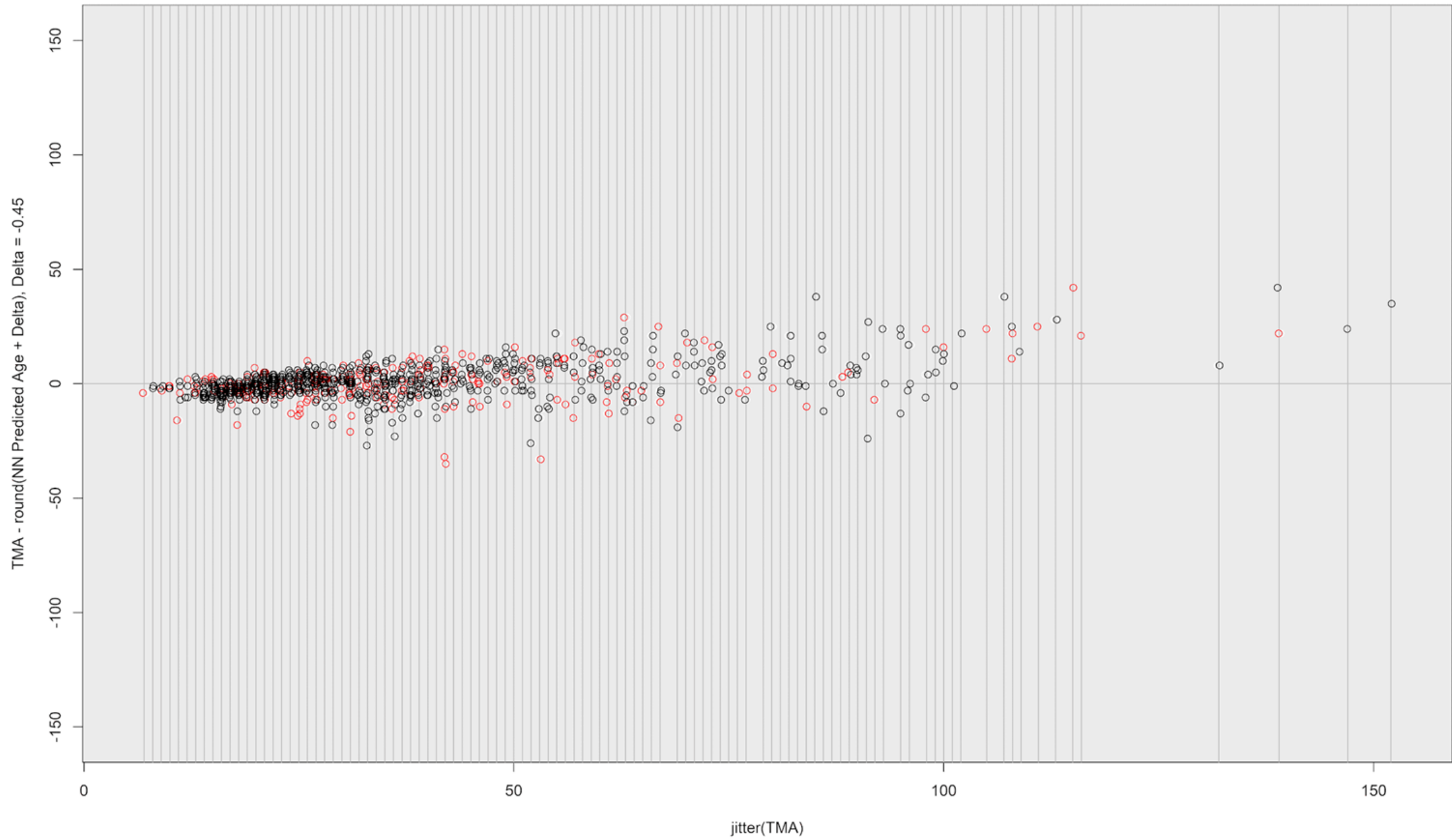- Prediction includes data from 2011

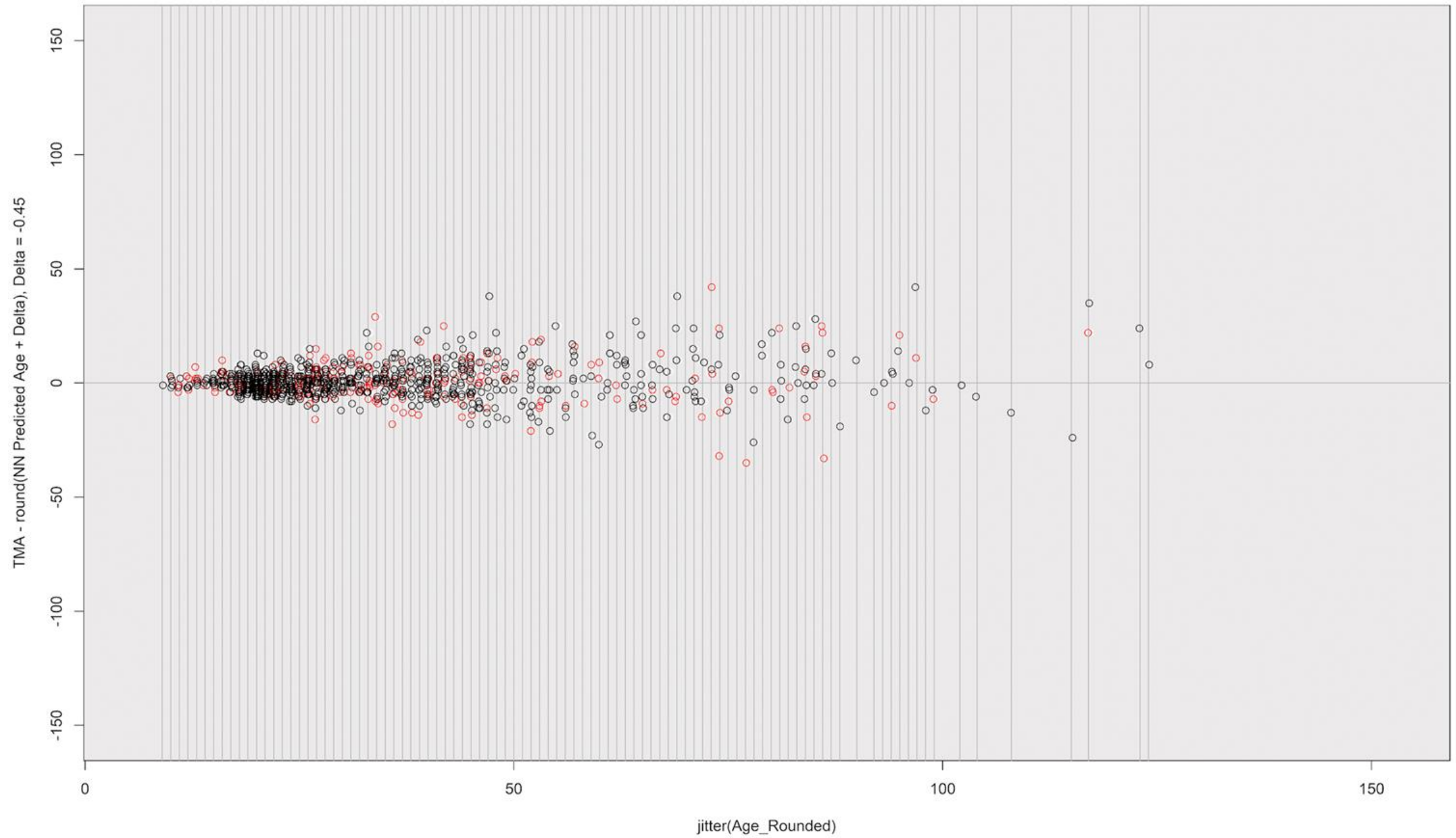| Model	R^2	APE	MRE	Note
S_750N	0.8769	7.460	4.972	
SM_750N	0.8642	7.372	5.046	Otie Wght Only
SM_750N	0.8730	7.361	5.354	Otie Wght, Fish Len

Independent Variables
- NIRS Spectra
- Otolith Weight
- Fish Length

TMA: R^2 = 0.8730; RMSE = 7.8470; SAD = 5536; APE = 7.381; N_Pred = 1034 (Prediction rounded after adding Delta for Stats)

Rougheye/Blackspotted Complex, Agreement

- Modeled ages agree with primary reads < 10% of the time
- Double-read agreement is also poorer than for sablefish, but much better than for modeled ages
- Adding sample data to models yields minimal improvement

	N Obs	Avg Pr. Age	APE	R^2	% Agree.	+/- 1 year	+/- 2 years	+/- 5 years	+/- 10 years
Modeled ages vs primary reads									
Spectral and sample* data	1,034	36.70	7.36%	0.873	7.7%	23.3%	36.2%	66.0%	87.0%
Spectral and otolith weight data	1,360	34.49	7.37%	0.864	7.5%	25.0%	40.0%	68.8%	88.8%
Spectral and otolith weight data	2,456	38.16	7.34%	0.884	7.9%	22.2%	35.0%	65.5%	87.1%
Only FT-NIRS spectral data	1,364	34.45	7.46%	0.877	8.4%	24.3%	36.4%	67.7%	89.0%
Primary reads vs double reads									
All readers; samples from 2003-2023	1,935	27.27	7.10%	0.918	20.3%	45.5%	58.5%	77.6%	90.6%
2012 and 2013 age reading	739	24.25	7.85%	0.909	17.5%	42.4%	57.1%	77.7%	91.6%
2024 age reading	1,196	29.14	6.64%	0.920	22.0%	47.4%	59.4%	77.5%	90.1%

* Sample data in the full model include otolith weight and fish length

Rougheye/Blackspotted vs sablefish

- Sablefish and rougheye/BS have very different age distributions
- Further study should explore whether this can be an indicator of the potential usefulness of modeling ages
- Might work better for chilipepper rf than for rougheye/BS