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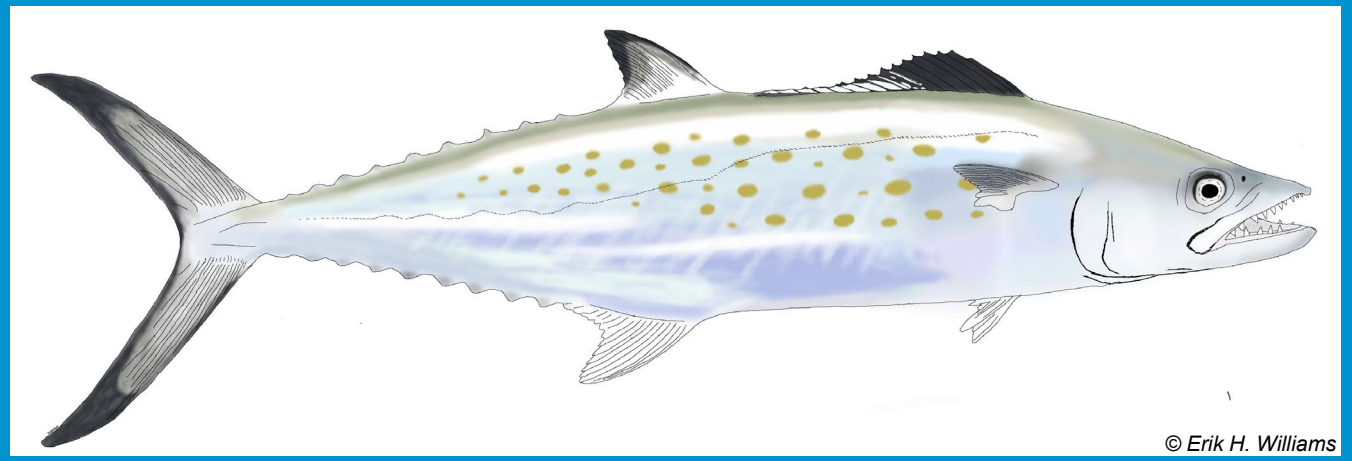
NMFS/SEFSC
Sustainable
Fisheries Division

Spanish Mackerel: Review of Issues



Erik H. Williams
Chief, Atlantic Fisheries Branch

Recommendations from SSC Workgroup

- Use a recent average recruitment instead of model-derived recruitment from the stock-recruit relationship. Determine an appropriate MSY proxy and timeseries for average recruitment.

- 1) Consider a sensitivity run with the most recent 3-year (2018-2020) (geometric) average representing 2020 data point. Alternatively, consider a sensitivity run with the most recent 3-year (2018-2020) (geometric) average weighted by reverse-CV representing 2020 data point. Evaluate and note in the report any particular concerns or problems with the MRIP data collected in 2020.

- Use a more contemporary *M* estimation method (e.g. Hamel and Cope 2022) to obtain a point estimate.

- Consider applying a uniform distribution (non-truncated?) on *M* with a range of values corresponding to a maximum age +/- 2 with the mean equal to the chosen point estimate when conducting the MCB ensemble uncertainty analysis Monte Carlo draws

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Issues Raised by SSC

- MRIP data
- Age sampling
- Constraints of Operational Assessment
- Natural mortality (M)
- Fixed steepness

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Issues Raised by SSC

- MRIP data
  - Uncertainty of estimates
  - 2020-2021 data points
    - Imputation
    - Down wgt 2020 point in projections
  - High PSEs

	(1000s)			Dead (1000s)		
Year	**A+B1**	**PSE**	**Imputation**	**B2**	**PSE**	**Imputation**
2012	2062	12.2	0%	239	15.3	0%
2013	3898	17.9	0%	545	22.1	0%
2014	2650	10.5	0%	380	19	0%
2015	1492	15.7	0%	213	14.5	0%
2016	3439	24.5	0%	426	29	0%
2017	1779	13.9	0%	298	16	0%
2018	2468	13.1	0%	628	23.4	0%
2019	4016	9.9	0%	862	12.2	0%
2020	6382	19.5	12%	1058	15	20%
2021	8568	17.4	0%	1218	21.2	0%
2022	3989	13.4	0%	856	18.7	0%

- *PSEs are all <25%*
- *Imputation is small and only in 2020*
- *2020 data point is not a one year 'spike'*

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Issues Raised by SSC

- Age sampling
  - Commercial age sampling
    - Sample sizes similar to reeffish species

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Issues Raised by SSC

- Constraints of Operational Assessment (OA)
  - More accurate to be concerned about constraints in the TORs/SOWs
  - Balanced the need to:
    1. Follow the TORs/SOWs
    2. Honor the benchmark assessment decisions
    3. Modify the model to latest advances
    4. Incorporate reviewers recommendations

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Issues Raised by SSC

- Natural mortality (*M*)
  - Estimation in model and profile
    - Model estimation of *M* assumes all other aspects are accurately specified
    - Profile on *M* may indicate better value to use, or could point to data sources that are mis-specified (e.g. if age comp profile suggests different *M*, that could be due to mis-specified selectivity).
    - Need to understand what data circumstances lead to good *M* estimates (unanswered research question).

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Issues Raised by SSC

- Natural mortality (*M*)
  - Newest *M* estimation methodology
    - SEDAR 78 stock assessment report – May 2022
    - Hamel and Cope (2022) paper on *M* estimation – August 2022

    Published after the assessment was completed

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Issues Raised by SSC

- Fixed steepness
  - Fixing steepness or using a mean recruitment (R) model are essentially the same thing
  - Mean R model needs a choice of proxy (e.g. $F_{40\%}$)
  - For each steepness value there is a corresponding $F_{X\%}$ proxy that will give the same F value

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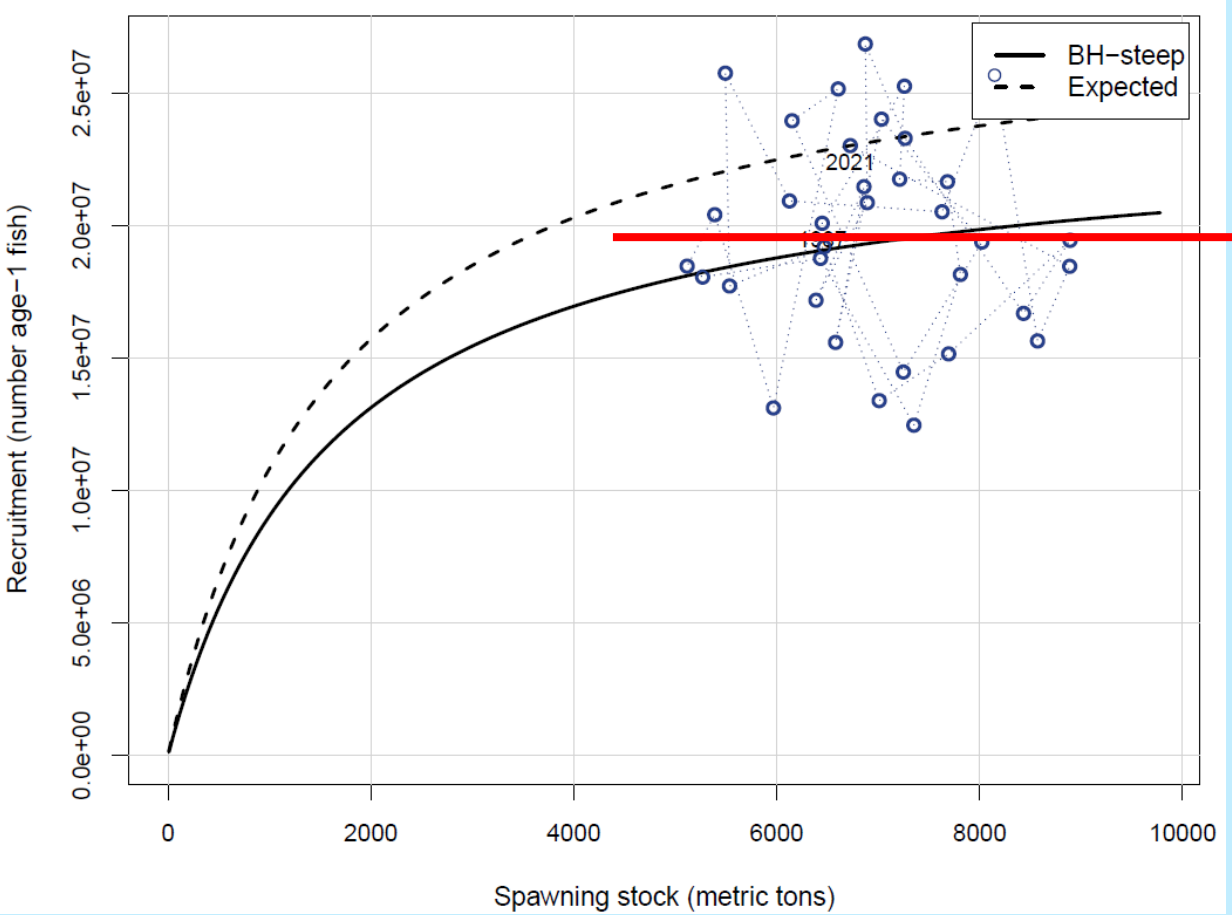
Issues Raised by SSC

- Fixed steepness
  - Use a recent average recruitment instead of model-derived recruitment from the stock-recruit relationship.



Likely Mean *R* Model

Recent *R* similar to all years

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SEFSC Response

Regarding Spanish Mackerel (SEDAR 78), the Center has taken note of the SSC recommendations regarding natural mortality, assumed recruitment and catch estimates, and agrees that those issues should be considered during the next scheduled stock assessment. However, as the proposed revisions are exploratory in nature and require extensive rework, they cannot be accomplished in a timely fashion. Therefore, the Center recommends the SSC develop its ABC advice based on the assessment and supporting analyses completed to date. Pursuant to National Standard 2 Guidelines 50 CFR 600.315(a)(6)(v): Mandatory management actions should not be delayed due to limitations in the scientific information or the promise of future data collection or analysis. The Center has also determined that the use of data-limited approaches such as DB-SRA or DCAC in place of the current age-structured assessment model would not be consistent with BSIA. The current assessment is superior to any product that can be derived from these simple approaches even when considering the issues identified by the SSC.

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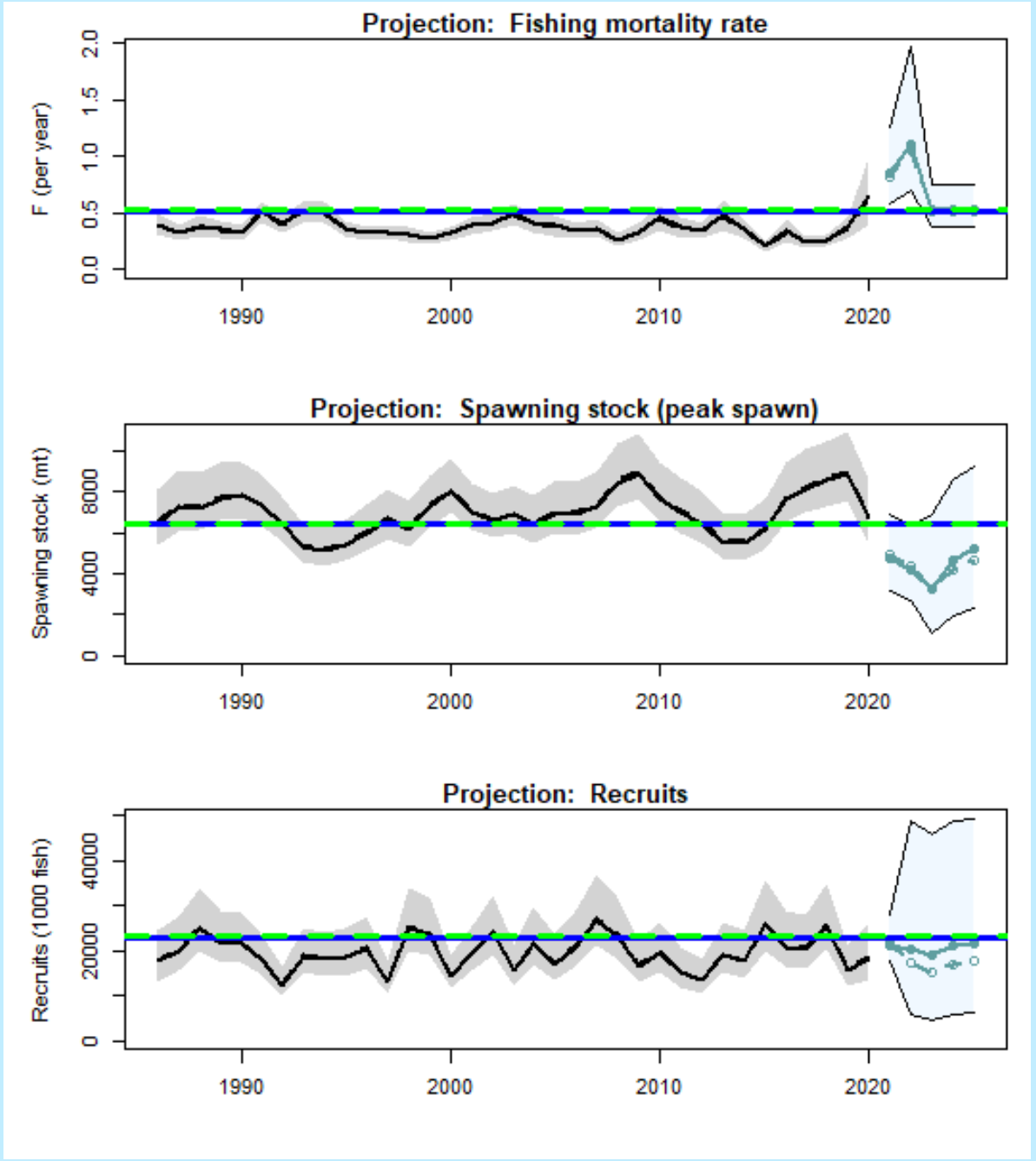
Fmsy

Shaded area = 5th and 95 percentile

Horizontal lines = MSY-related quantities (blue=base, green=MCBE median)

Solid estimate lines=base run or deterministic projection estimates

Dashed estimate lines=median values from MCBE or stochastic projection



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75%Fmsy

Shaded area = 5th and 95 percentile

Horizontal lines = MSY-related quantities (blue=base, green=MCBE median)

Solid estimate lines=base run or deterministic projection estimates

Dashed estimate lines=median values from MCBE or stochastic projection

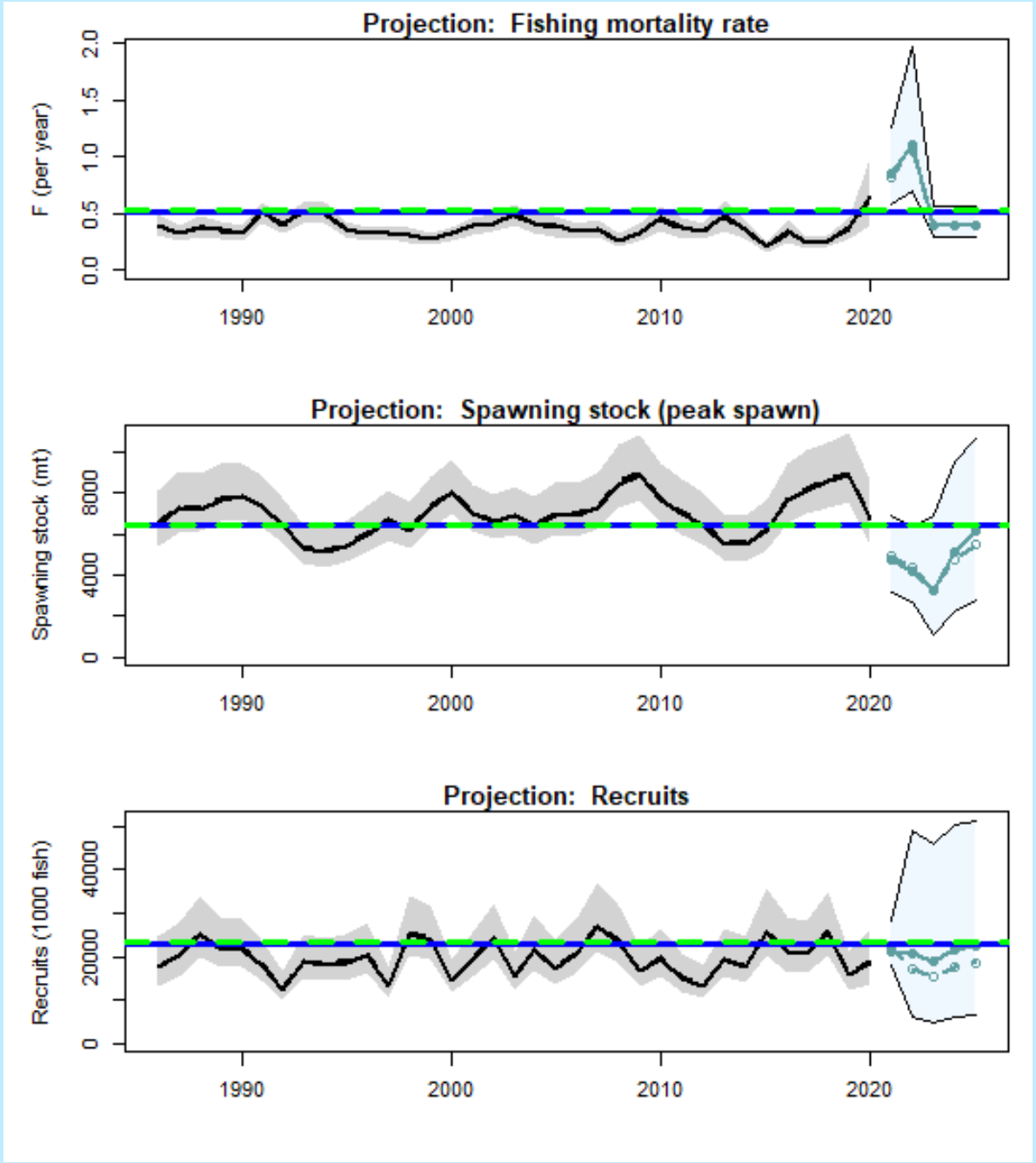

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Table 25. Projection results with fishing mortality rate fixed at $F = F_{MSY}$ starting in 2023. Interim period (2021-2022) assumed constant landings based on the average of the last 3 years of the assessment. R = number of age-0 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt) at peak spawning time, L = landings expressed in numbers (n, in 1000s) or whole weight (w, in 1000 lb*), and D = dead discards expressed in numbers (n, in 1000s) or whole weight (w, in 1000* lb*), pr.rebuild = proportion of stochastic projection replicates with* $SSB \geq SSB_{MSY}$*. The extension* b *indicates expected values (deterministic) from the base run; the extension* med *indicates median values from the stochastic projections.*

Year	R.b	R.med	F.b	F.med	S.b(mt)	S.med(mt)	L.b(n)	L.med(n)	L.b(w)	L.med(w)	D.b(n)	D.med(n)	D.b(w)	D.med(w)	pr.reb
2021	21287	21728	0.85	0.81	4761	4928	6575	6471	10556	10450	1777	1518	842	745	0.193
2022	20531	17043	1.10	1.03	4164	4383	7342	7198	10556	10441	2069	1725	1016	885	0.124
2023	18993	14749	0.52	0.52	3239	3259	3570	3415	4891	4909	953	764	480	402	0.113
2024	21128	16681	0.52	0.52	4626	4149	4125	3757	5796	5440	1049	842	519	432	0.181
2025	21804	17407	0.52	0.52	5244	4552	4612	4118	6606	5996	1093	884	550	458	0.230

Table 26. Projection results with fishing mortality rate fixed at $F = 75\%F_{MSY}$ starting in 2023. Interim period (2021-2022) assumed constant landings based on the average of the last 3 years of the assessment. R = number of age-0 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt) at peak spawning time, L = landings expressed in numbers (n, in 1000s) or whole weight (w, in 1000 lb*), and D = dead discards expressed in numbers (n, in 1000s) or whole weight (w, in 1000* lb*), pr.rebuild = proportion of stochastic projection replicates with* $SSB \geq SSB_{MSY}$*. The extension* b *indicates expected values (deterministic) from the base run; the extension* med *indicates median values from the stochastic projections.*

Year	R.b	R.med	F.b	F.med	S.b(mt)	S.med(mt)	L.b(n)	L.med(n)	L.b(w)	L.med(w)	D.b(n)	D.med(n)	D.b(w)	D.med(w)	pr.reb
2021	21287	21728	0.85	0.81	4761	4928	6575	6471	10556	10450	1777	1518	842	745	0.193
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2023	18993	14749	0.39	0.39	3239	3259	2784	2667	3827	3850	725	582	367	307	0.113
2024	21708	17212	0.39	0.39	5149	4655	3401	3117	4853	4597	819	661	408	340	0.260
2025	22573	18160	0.39	0.39	6116	5374	3957	3573	5815	5342	863	704	438	368	0.360

Questions?

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