Oregon Recreational Groundfish Inseason Projection Model

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MRIP Data Timeliness Workshop

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In Oregon, our world revolves around Yelloweye rockfish

ORBS Sampling Locations (months)

^ Primary Ports -- Sampled every year.

Secondary Ports -- Sampled most years. Activity level generally less than 2% of coastwide effort.

! Alternate Ports -- Generally not sampled. Make up less than 1% of the effort at the single nearest primary port.

? Occassional Access Points-- These are sites that are hazardous for access. Best information suggests that effort is less than 0.1% of coastwide activity.

Inseason Tracking/Projection Model

Model Inputs—by month and species

- # fish landed
- # fish released
- Depth of released fish
- Discard mortality % for discarded species
- Average weight
- Get estimated weight (mt)

Inseason Tracking/Projection Model

Data flow from ORBS to fishery managers

- **Final** data on a month time lag
  - Get data for March during first week in May
- Can get preliminary data 4-5 days after month end
  - Get data for March during first week in April
  - Data has not been completely error checked
  - Usually not much difference between preliminary and final
- Can get *really rough* data on weekly or bi-weekly
  - Data is likely to change, but gives managers an idea about effort and catch composition
  - Problem—chase a lot of noise in estimates

Inseason Tracking/Projection Model

- Compare cumulative to same time period previous 2 years to gauge how we are tracking
- Projection (prior to 2011)
  - (YTD observed)/(YTD Expected)* expected for month
  - Fill that in for the "observed" for remaining months
- Problems
  - Small sample sizes and large differences between observed and expected in early months (Jan-Mar) can provide inflated year end estimates

Inseason Tracking/Projection Model

Data through **08/30/2009**

	Black rf			Black & blue rf combo			Other nearshore rf			Cabezon		
	Expected	Obs ▸ Proj	Proj cum	Expected	Obs ▸ Proj	Proj cum	Expected	Obs ▸ Proj	Proj cum	Expected	Obs ▸ Proj	Proj cum
Jan	3.2	7.18	7.2	2.6	6.75	6.7	0.1	0.32	0.3	0.2	0.71	0.7
Feb	6.8	6.43	13.6	6.5	6.00	12.7	0.2	0.23	0.6	0.6	0.39	1.1
Mar	18.0	8.26	21.9	18.0	7.39	20.1	0.6	0.19	0.7	1.5	0.51	1.6
Apr	26.3	25.61	47.5	26.6	24.95	45.1	0.8	0.59	1.3	1.9	2.00	3.6
May	47.4	33.73	81.2	48.8	33.01	78.1	1.6	1.38	2.7	4.1	2.76	6.4
June	75.8	58.93	140.1	81.1	58.95	137.1	2.3	1.60	4.3	5.4	3.04	9.4
July (5 wks)	83.6	65.52	205.7	87.3	65.70	202.8	3.2	1.56	5.9	5.8	3.64	13.1
Aug (4 wks)	96.9	55.44	261.1	100.6	55.36	258.1	4.5	1.31	7.2	7.6	2.08	15.1
Sept	41.2	30.04	291.1	42.8	29.74	287.8	1.9	1.05	8.2	2.8	1.54	16.7
Oct	14.7	10.75	301.9	16.3	11.33	299.2	0.5	0.26	8.5	1.0	0.56	17.2
Nov	5.9	4.31	306.2	5.8	4.03	303.2	0.1	0.05	8.5	0.1	0.08	17.3
Dec	3.3	2.39	308.6	2.6	1.79	305.0	0.1	0.04	8.6	0.5	0.28	17.6
Total	423.1	308.6		439.1	305.0		15.7	8.6		31.5	17.6	
Catch Limit	440.8			481.8			13.6			15.8		
thru Aug	358.0	261.1		371.6	258.1		13.2	7.2		27.1	15.1	
		70%			63%			63%			111%	
Yr-end projection		**308.6**	132.2		**305.0**	176.8		**8.6**	5.0		**17.6**	-1.8
			over/under			over/under			over/under			over/under

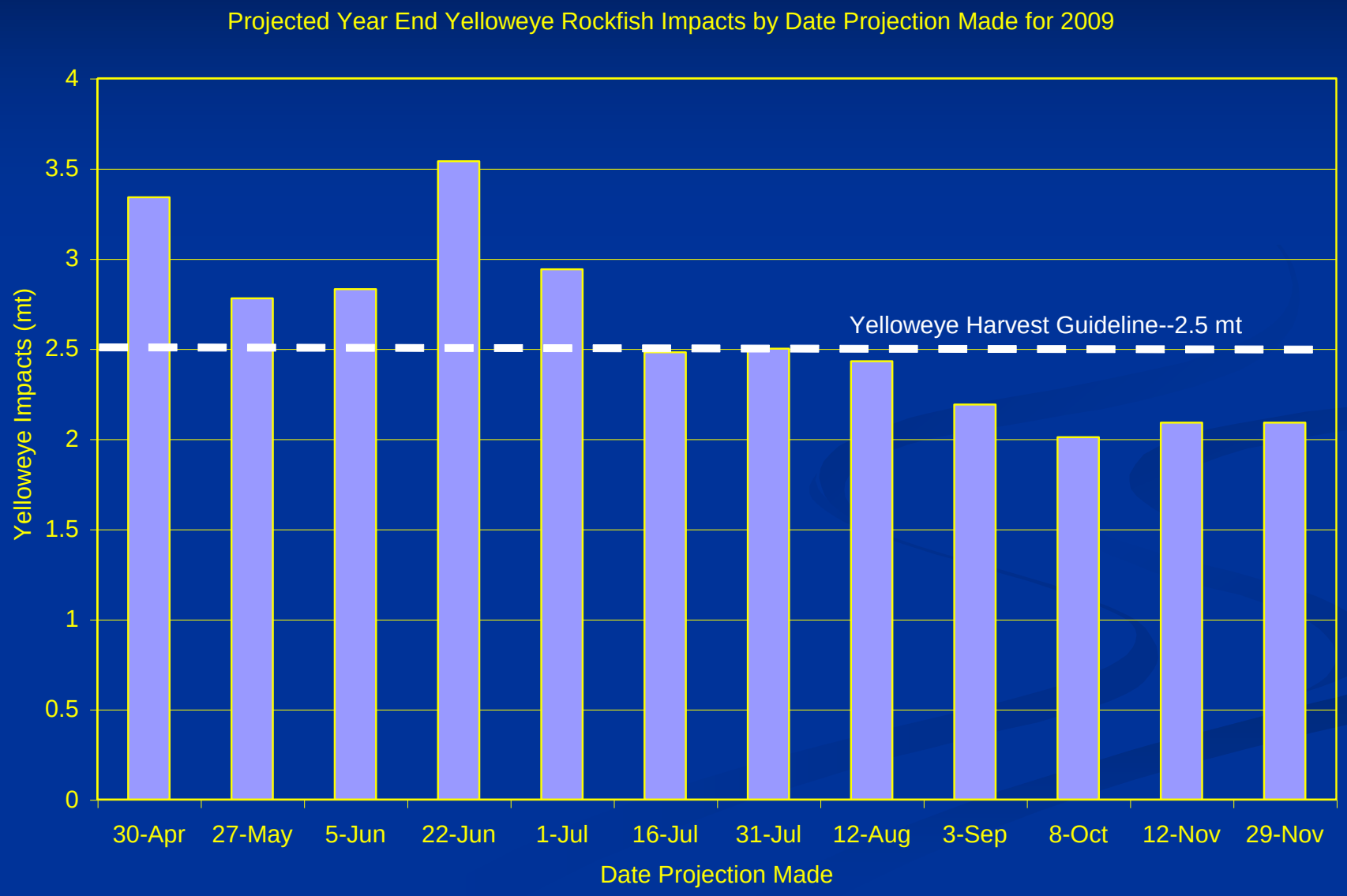
red font = projected (Proj):
Monthly projections were calculated using factor [(YTD obs/YTD expected)(expected)].

History of Season-End Projections for 2009

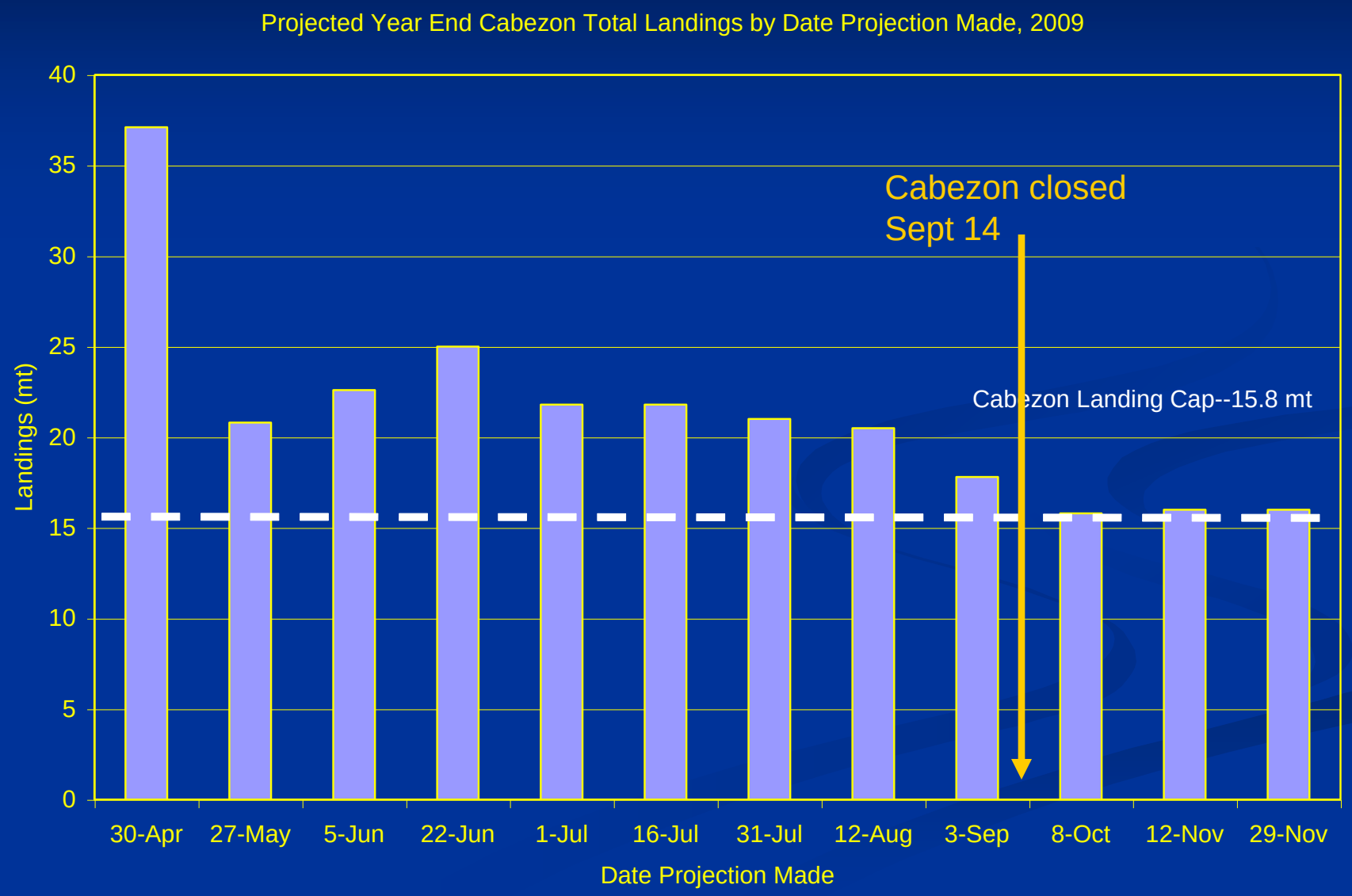
History of Revised Season Projections by Week for 2009

	Limit (mt)	Year-end projection (mt) made on											
		30-Apr	**27-May**	**5-Jun**	**22-Jun**	**1-Jul**	**16-Jul**	**31-Jul**	**12-Aug**	**3-Sep**	**8-Oct**	**12-Nov**	**29-Nov**
Black	442	337	285.6	310.3	360.9	341.8	351.5	330.2	333.6	308.1	307.1	307.2	307.2
Black+Blue	482	333	276.6	305.0	351.1	336.0	344.5	325.7	328.2	304.8	306.2	306.2	306.2
Yelloweye	2.5	3.34	2.78	2.83	3.54	2.9	2.48	2.5	2.4	2.2	2.0	2.1	2.1
ONSRF	13.6	10.6	9.5	11.0	12.2	12.6	10.9	10.6	10.5	8.7	8.4	8.6	8.6
Canary	16	5.6	3.8	4.8	4.8	3.9	3.1	3.3	3.2	2.9	2.8	3.0	3.0
Cabezon	15.8	37.1	20.8	22.6	25.0	21.8	21.8	21.0	20.5	17.8	15.8	16.0	16.0
Greenling	5.2	5.1	4.4	5.0	4.9	5.1	5.5	5.3	5.0	4.2	4.0	4.1	4.1

History of Season-End Projections for 2009



History of Season-End Projections for 2009



Inseason Tracking/Projection Model

- Projection (starting in 2011)
  - Examining 3 other projection methods
    - ETS (Econometric Time Series)
    - ARIMA (Autoregressive Integrated Moving Average)
    - ETS + ARIMA
  - Will still be doing "standard" method
  - See which one is most accurate
    - Hope for less chasing of "noise" during the season

ARIMA

- Autoregressive Integrated Moving Average
- Developed by Box and Jenkins (1976)
- Form: ARIMA(p,d,q), where p=order of autoregressive term, d=degree of differencing involved in order to reach stationarity, q=order of moving average
- Used to forecast data where there are observable non-stationary process with clearly identifiable trends, such as a constant (d=0), linear (d=1) or quadratic (d=2) trend
- 3 main components:
  - Autoregressive component – each observation made up of a random error component and a linear combination of prior observation
  - Stationarity component – an autoregressive process must fall within a certain range to be stable (i.e. if p=1, then autoregressive parameter, φ, must be between -1 and 1), must difference data set to achieve stability
  - Moving average component – each observation made of random error and linear combination of prior random errors

ETS

- Econometric Time Series
  - originally used to forecast revenue and stock price fluctuations
- Simplest equation $C_t = a + bY_{t-1} + e_t$, where a and b = parameter estimates, Y= value from previous time step, e_t = error term
- Model form (ETS (Error, Trend Type, Season Type))
- Implemented in R software, program automatically chooses exact model if not specified.
  - However, can be manipulated, ie. dampening, lower parameter bounds, optimization criteria, etc

	Black rockfish			
	PROJECTIONS			
	default	ETS	ARIMA	ETS+ARIMA
jan	4.5	3.6	0.0	1.8
feb	7.9	7.1	2.3	4.7
mar	10.2	13.5	7.0	10.2
apr	22.4	25.5	19.3	22.4
may	35.8	37.1	36.5	36.8
jun	56.9	55.5	56.3	55.9
jul	69.5	63.2	71.6	67.4
aug	62.8	63.8	67.7	65.8
sep	30.2	27.4	37.9	32.7
oct	7.9	8.2	15.2	11.7
nov	1.2	3.1	5.9	4.5
dec	1.5	2.9	1.7	2.3
2011	**311.0**	**310.9**	**321.4**	**316.2**
Limit:	440.8	440.8	440.8	440.8
% limit	70.55%	70.53%	72.92%	71.73%
current %	sum	sum	sum	sum

	Other rockfish spp.			
	PROJECTIONS			
	default	ETS	ARIMA	ETS+ARIMA
jan	0.0	0.0	0.1	0.0
feb	0.3	0.3	0.3	0.3
mar	0.2	0.3	0.5	0.4
apr	0.3	0.6	0.7	0.7
may	1.8	1.5	1.5	1.5
jun	2.0	1.9	1.8	1.9
jul	2.7	2.2	2.1	2.2
aug	2.2	2.4	2.1	2.3
sep	1.0	1.2	1.1	1.1
oct	0.0	0.1	0.3	0.2
nov	0.0	0.1	0.2	0.1
dec	0.0	0.1	0.1	0.1
total	**10.7**	**10.6**	**10.7**	**10.7**
Limit:	13.6	13.6	13.6	13.6
% limit	78.59%	78.08%	78.99%	78.53%
current %	sum	sum	sum	sum

Yelloweye

Halibut Fishery

	default	ETS	ARIMA	ETS + ARIMA
may	0.143	0.261	0.312	0.287
jun	0.260	0.233	0.232	0.233
jul	0.102	0.143	0.110	0.127
aug	0.297	0.207	0.131	0.169
sept	0.000	0.138	0.122	0.130
total	0.802	0.982	0.907	0.945

Bottomfish Fishery

	default	ETS	ARIMA	ETS+ARIMA
Jan	0.075	0.000	0.077	0.039
Feb	0.078	0.012	0.091	0.052
Mar	0.040	0.076	0.105	0.091
Apr	0.064	0.090	0.096	0.093
May	0.107	0.342	0.215	0.279
Jun	0.303	0.270	0.254	0.262
Jul	0.248	0.180	0.203	0.192
Aug	0.225	0.283	0.200	0.242
Sept	0.084	0.114	0.108	0.111
Oct	0.178	0.066	0.120	0.093
Nov	0.006	0.002	0.060	0.031
Dec	0.016	0.000	0.067	0.034
total	1.421	1.435	1.596	1.516

Total

Jan	0.075	0.000	0.077	0.039
Feb	0.078	0.012	0.091	0.052
Mar	0.040	0.076	0.105	0.091
Apr	0.064	0.090	0.096	0.093
May	0.250	0.603	0.527	0.565
Jun	0.563	0.503	0.486	0.495
Jul	0.350	0.323	0.313	0.318
Aug	0.522	0.490	0.331	0.411
Sept	0.084	0.252	0.230	0.241
Oct	0.178	0.066	0.120	0.093
Nov	0.006	0.002	0.060	0.031
Dec	0.016	0.000	0.067	0.034
total	2.222	2.417	2.503	2.460
Limit:	2.3	2.3	2.3	2.3
% limit	**96.61%**	**105.09%**	**108.83%**	**106.96%**
current '	sum	sum	sum	sum

Canary

Halibut Fishery

	default	ETS	ARIMA	ETS + ARIMA
may	0.112	0.184	0.133	0.158
jun	0.202	0.147	0.111	0.129
jul	0.094	0.098	0.069	0.084
aug	0.322	0.162	0.147	0.155
sept	0.000	0.124	0.067	0.096
total	0.730	0.715	0.528	0.622

Bottomfish Fishery

	default	ETS	ARIMA	ETS+ARIMA
Jan	0.074	0.005	0.000	0.003
Feb	0.166	0.043	0.062	0.053
Mar	0.120	0.146	0.181	0.163
Apr	0.185	0.223	0.326	0.274
May	0.473	0.423	0.574	0.498
Jun	0.438	0.378	0.643	0.510
Jul	0.600	0.438	0.722	0.580
Aug	0.483	0.480	0.473	0.477
Sept	0.188	0.141	0.234	0.188
Oct	0.143	0.067	0.023	0.045
Nov	0.029	0.005	0.000	0.003
Dec	0.017	0.000	0.000	0.000
total	2.916	2.350	3.238	2.794

Total

Jan	0.074	0.005	0.000	0.003
Feb	0.166	0.043	0.062	0.053
Mar	0.120	0.146	0.181	0.163
Apr	0.185	0.223	0.326	0.274
May	0.585	0.607	0.707	0.657
Jun	0.640	0.525	0.754	0.640
Jul	0.693	0.537	0.791	0.664
Aug	0.805	0.643	0.620	0.631
Sept	0.188	0.265	0.302	0.283
Oct	0.143	0.067	0.023	0.045
Nov	0.029	0.005	0.000	0.003
Dec	0.017	0.000	0.000	0.000
total	3.646	3.065	3.766	3.416
Limit:	7	7	7	7
% limit	**52.09%**	**43.79%**	**53.80%**	**48.79%**
current '	sum	sum	sum	sum

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