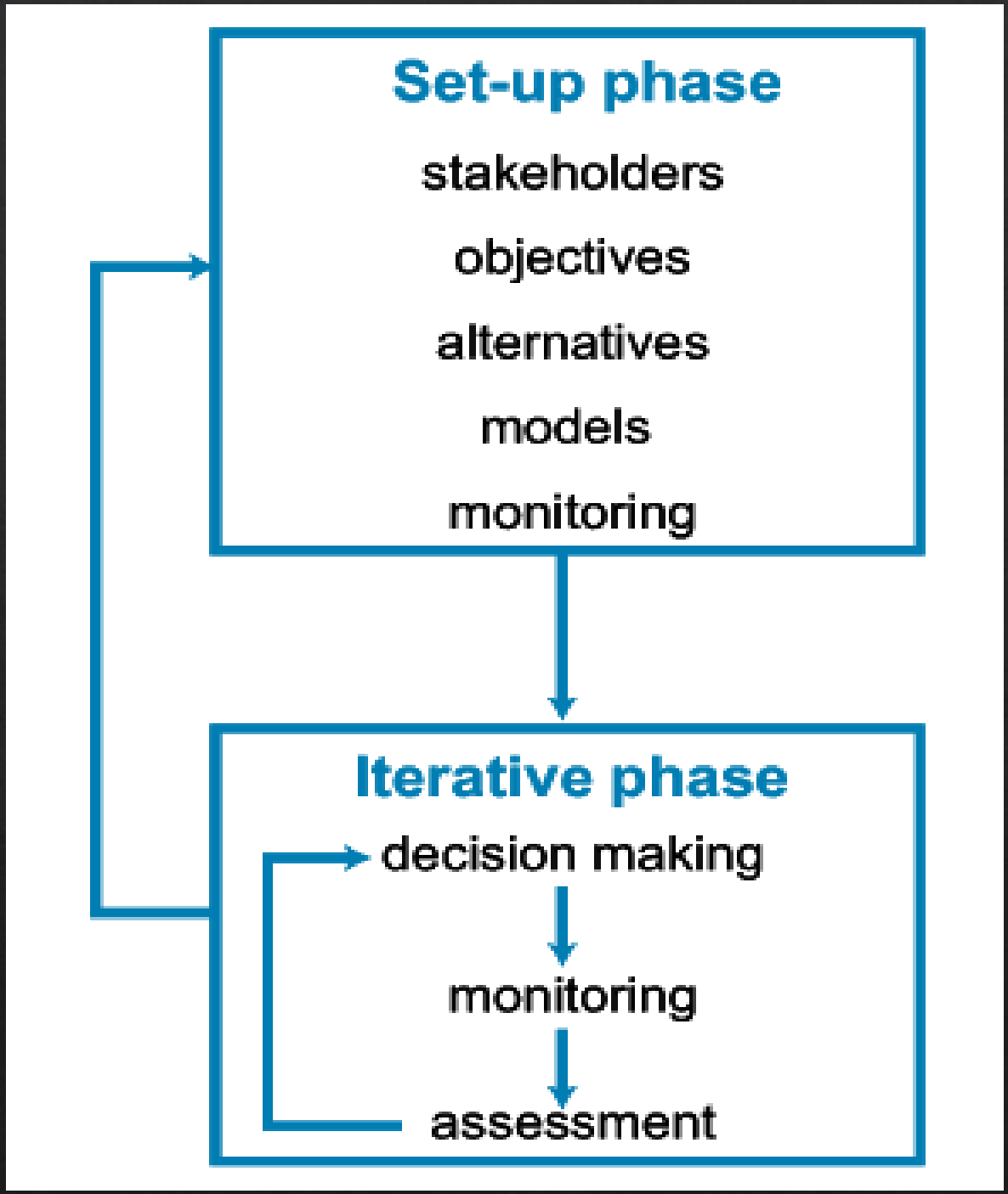
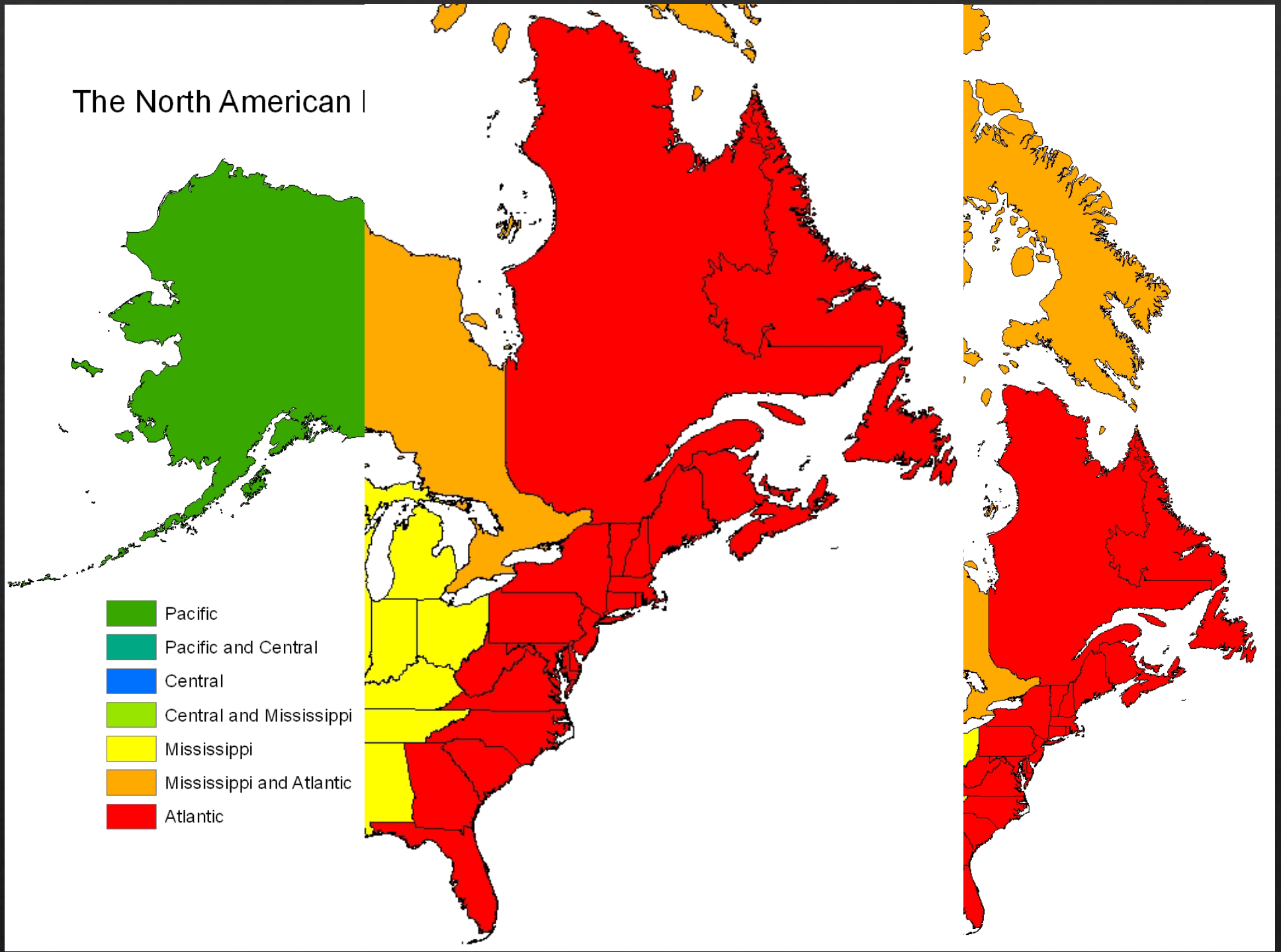
Revision of duck harvest frameworks in the US

W. Adam Phelps, Indiana Division of Fish and Wildlife
Min Huang, Connecticut Department of Energy and Environmental Protection
Mark Vrtiska, Nebraska Game and Parks Commission
G. Scott Boomer, US Fish and Wildlife Service


Set-up phase
stakeholders
objectives
alternatives
models
monitoring
Iterative phase
decision making
monitoring
assessment

The North American



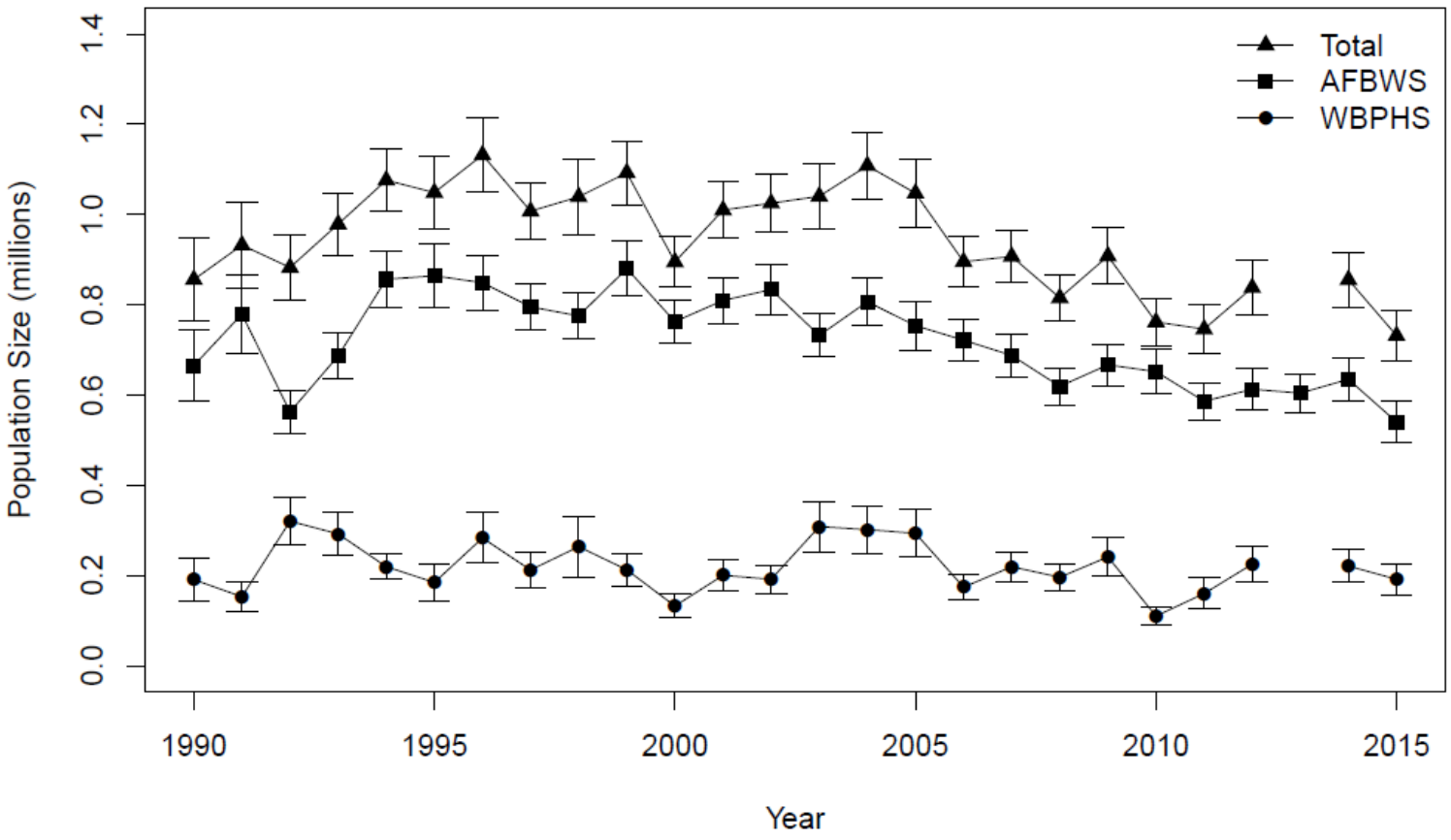


Figure 5 – Population estimates of eastern mallards observed in the northeastern states (AFBWS) and in southern Ontario and Quebec (WBPHS strata 51–54 and 56) from 1990 to 2015. In 2013, population estimates were only available for the northeastern states (AFBWS). Error bars represent one standard error.

Report from the Joint Task Group for Clarifying North American Waterfowl Management Plan Population Objectives and their Use in Harvest Management

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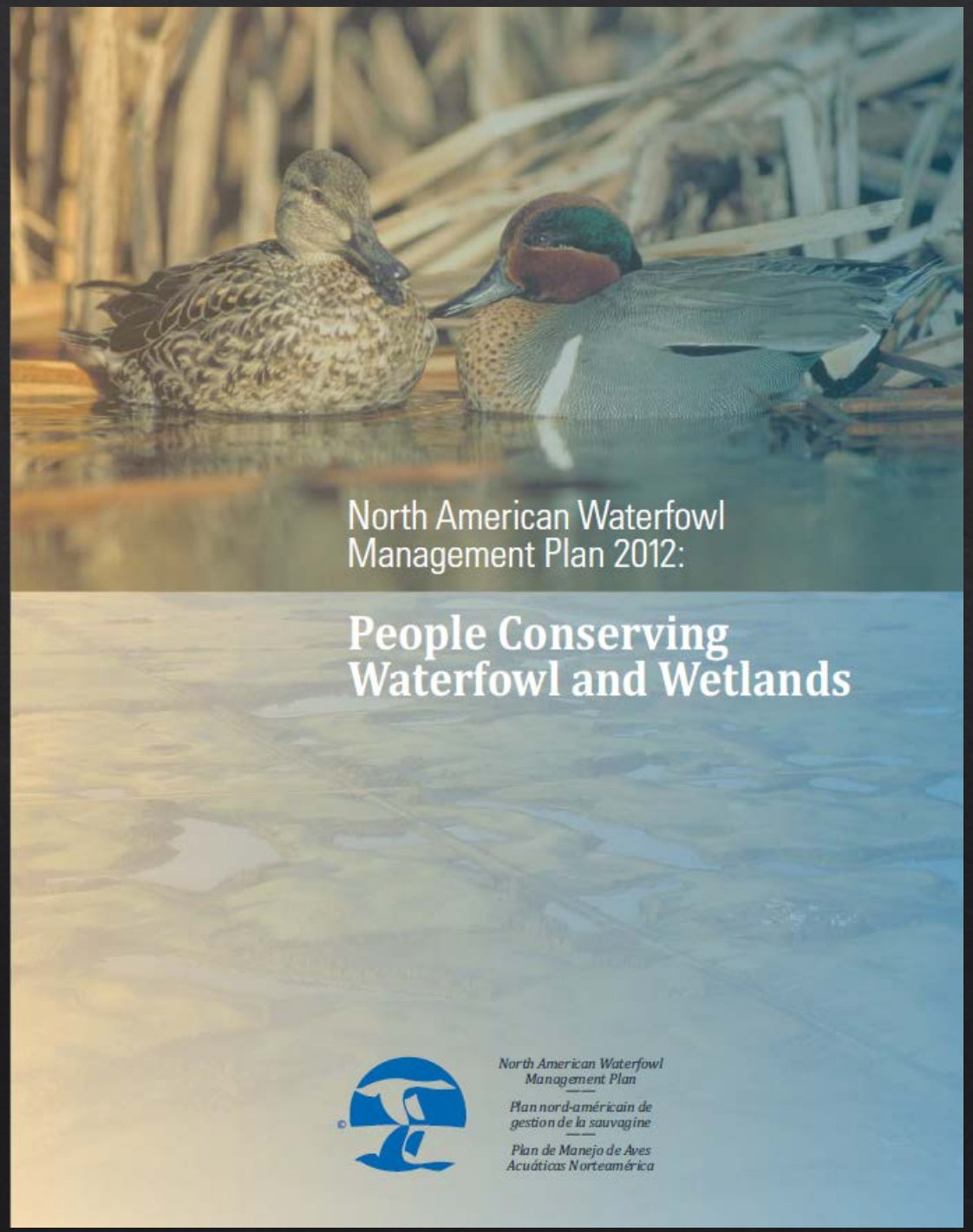
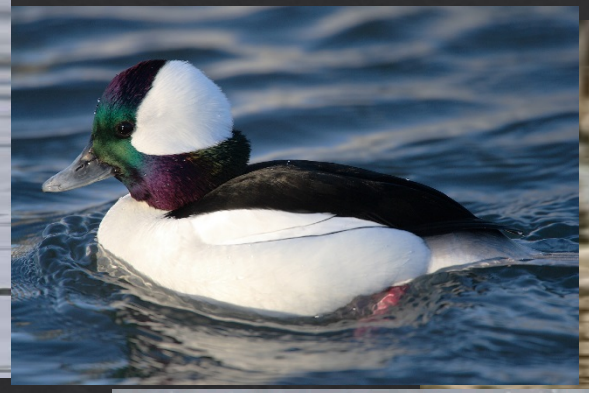


Long-term Conservation

Sustain Atlantic Flyway duck populations at levels that meet the legal mandates and demands for the recreational uses of this resource.

Hunting Opportunity

Maximize hunter satisfaction with harvest opportunity and regulations.





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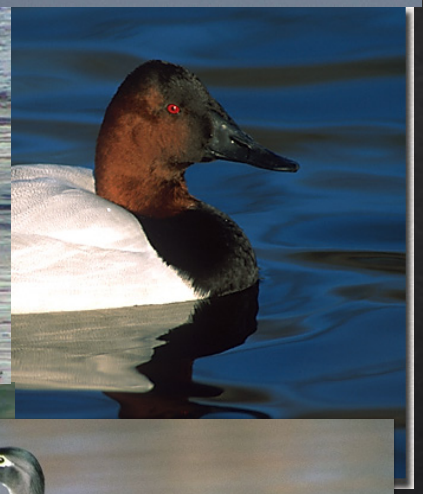


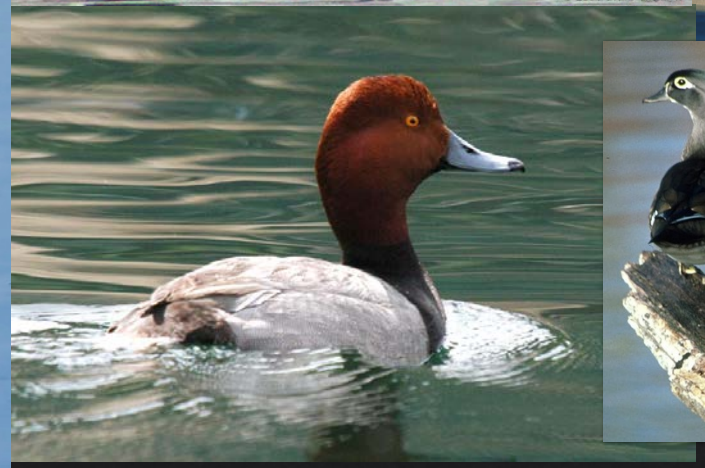




Table 5 – Optimal regulatory strategy[a] for the Atlantic Flyway for the 2018 hunting season. This strategy is based on current regulatory alternatives, eastern mallard models, model weights, and an objective to maximize long-term cumulative harvest. Predicated on a liberal alternative selected the previous year (2017), the shaded cell indicates the regulatory prescription for 2018.

	Previous Regulation			
BPOP[b]	Closed	Restrictive	Moderate	Liberal
≤0.5	C	C	C	C
0.525	L	R	C	C
0.55	L	L	R	C
0.575	L	L	L	R
0.6	L	L	L	L
0.625	L	L	L	L
≥0.65	L	L	L	L

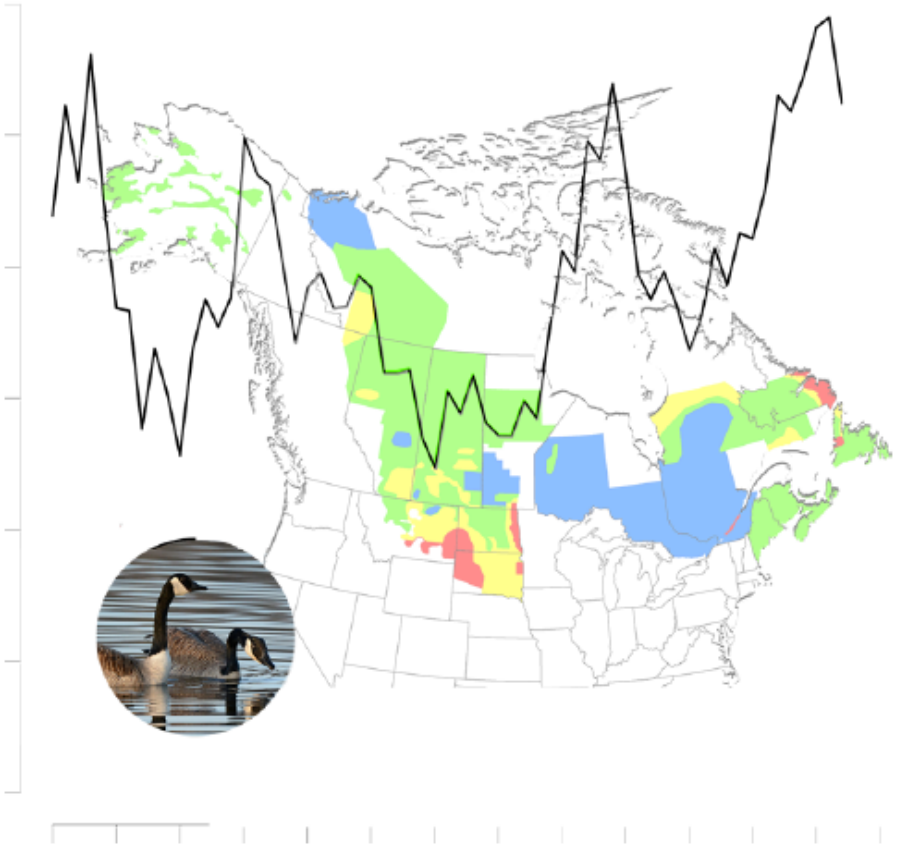
[a] C = closed season, R = restrictive, L = liberal.

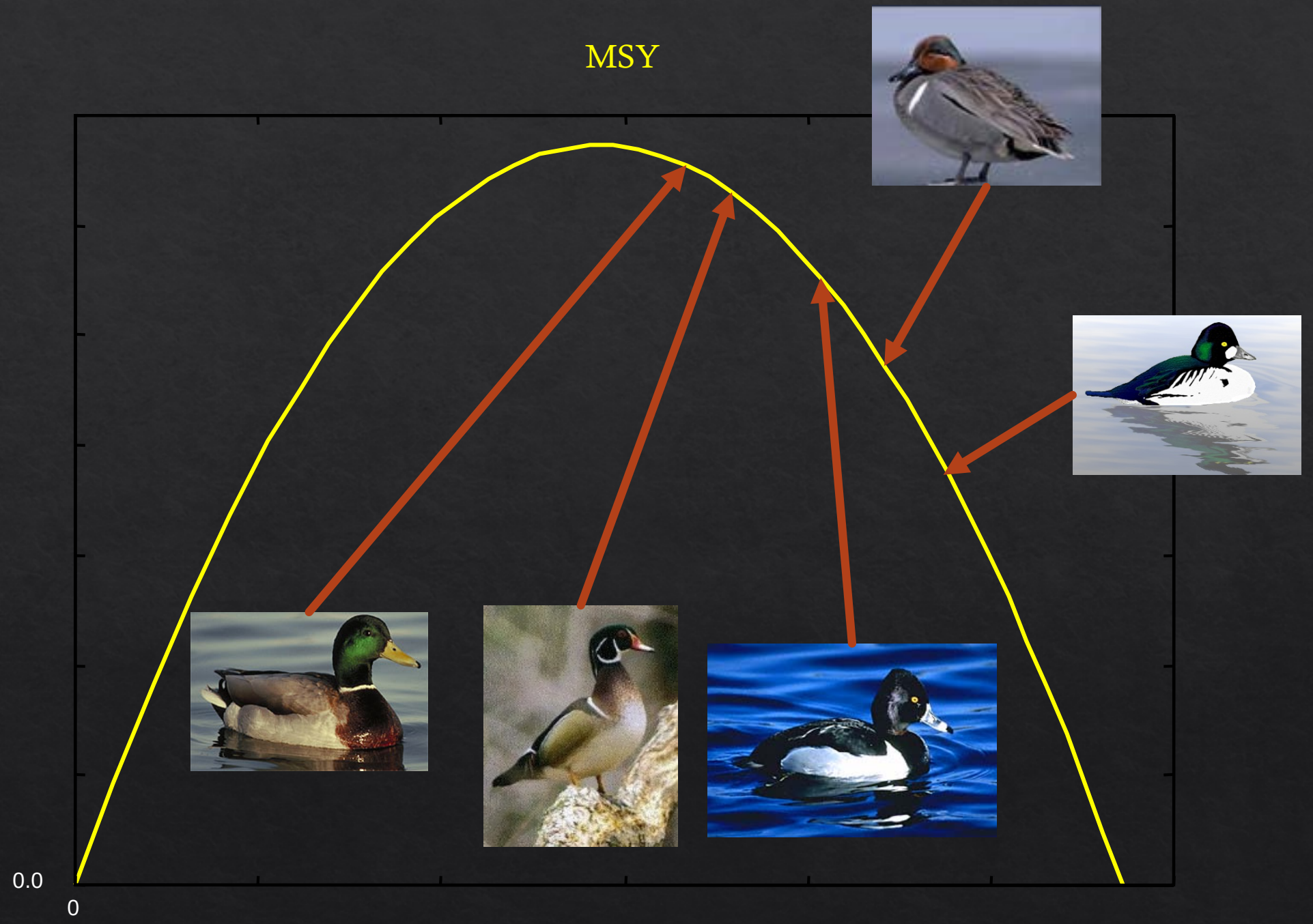
[b] Number of mallards (in millions) observed in eastern Canada (WBPHS strata 51–53, 56) and the northeastern United States (AFBWS).

U.S. Fish & Wildlife Service

Waterfowl

Population Status, 2017

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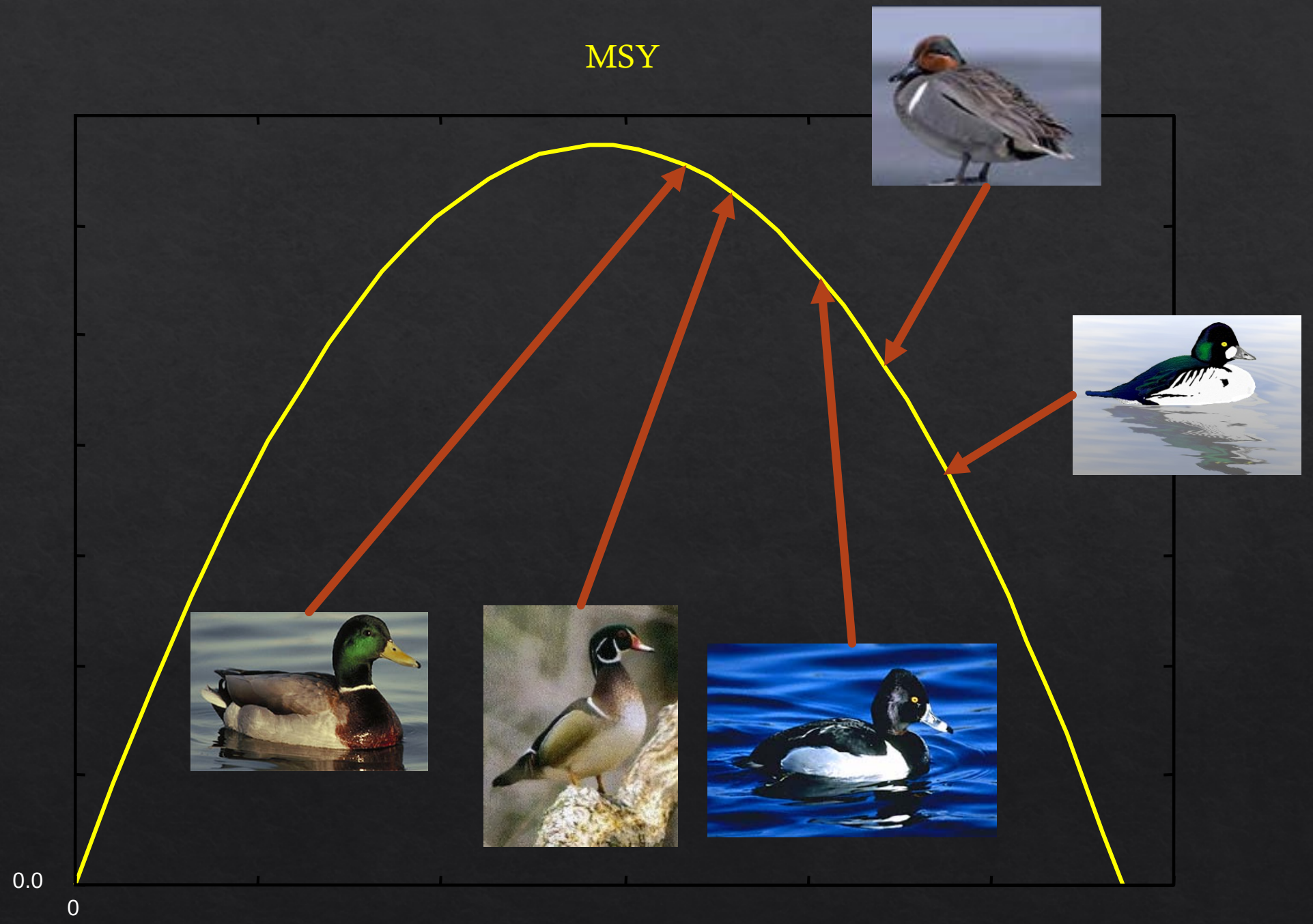
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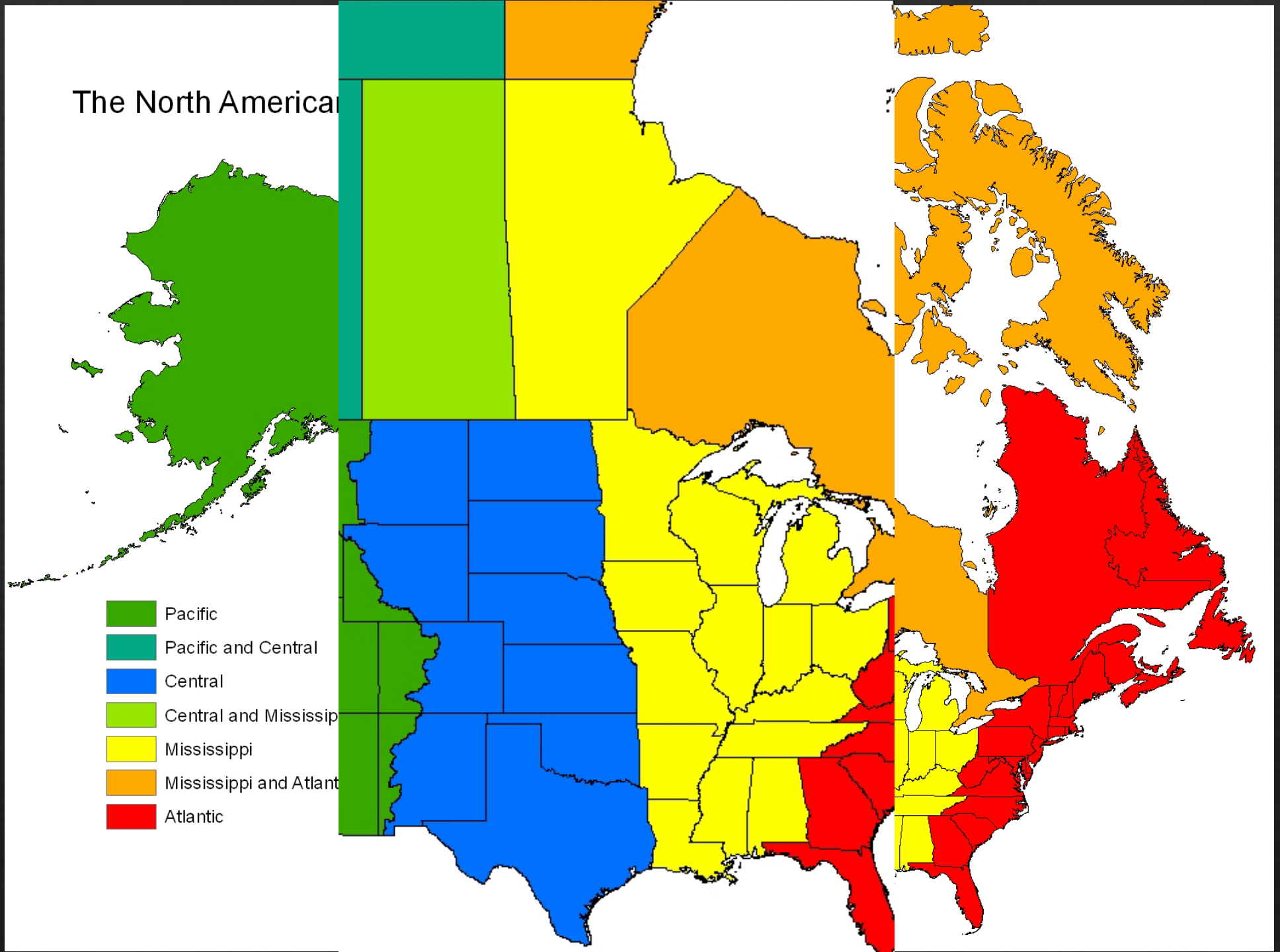
The Decision

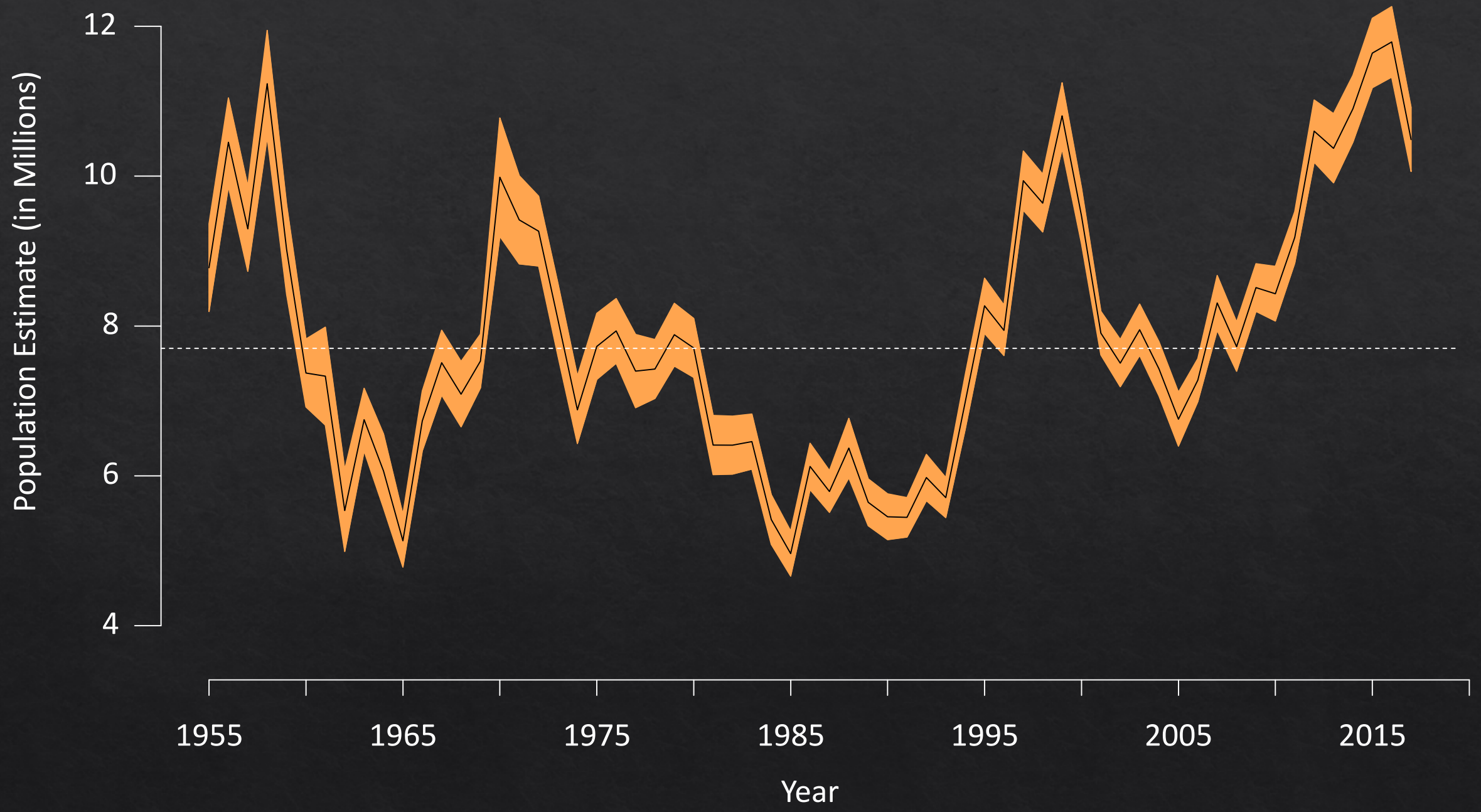
- Targeting a 98% shoulder point
- Regulatory Alternatives of Liberal, Moderate, Restrictive, Closed
- 6 Bird Daily Bag limit (2 Mallard Bag Limit)
- Weight species prior to optimization by importance to harvest of each Flyway Region

KEEP MOVING FORWARD

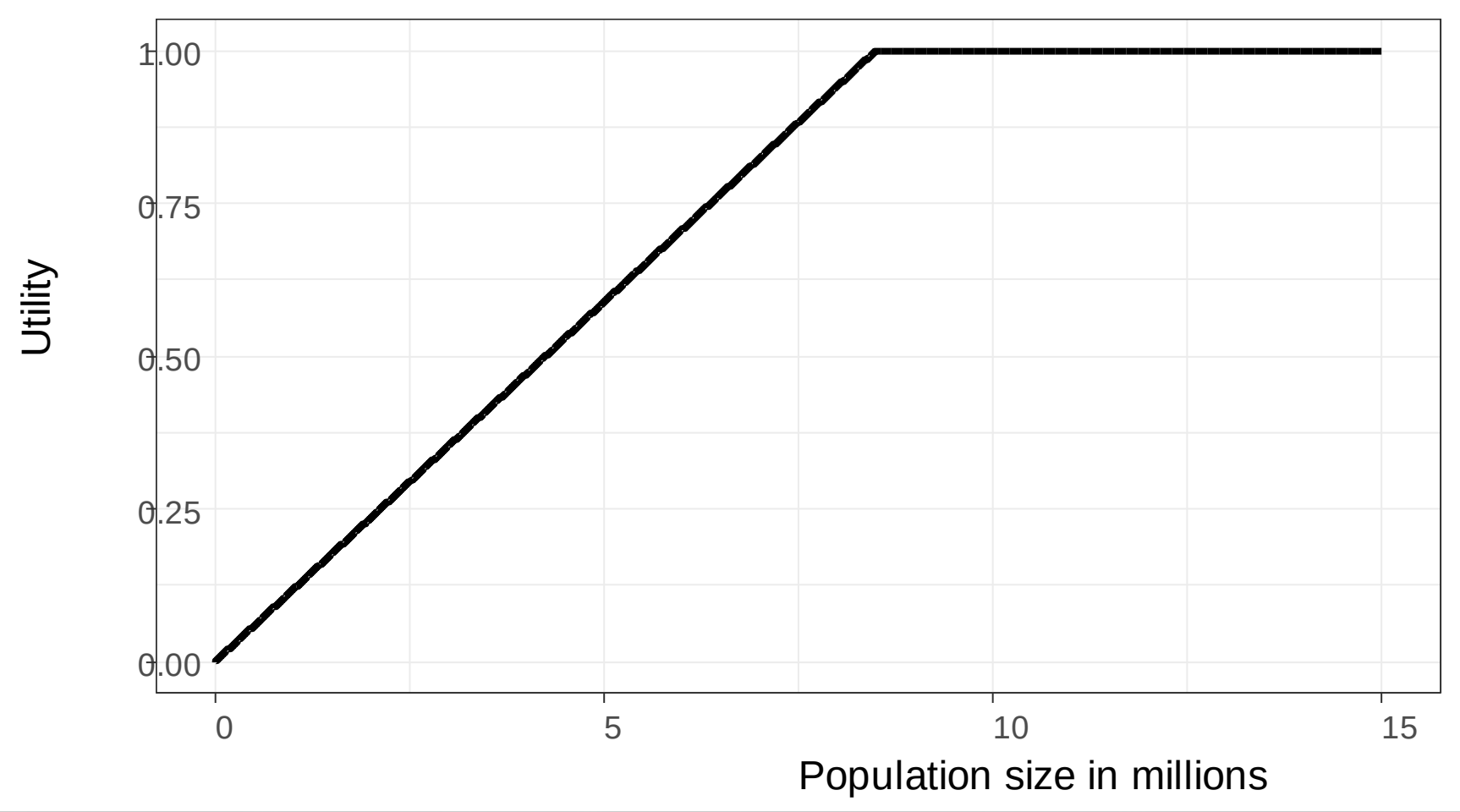

The North American
Pacific
Pacific and Central
Central
Central and Mississip
Mississippi
Mississippi and Atlant
Atlantic

Objective(s): The **goal** of mid-continent duck harvest management **is sustainable duck populations, maximizing long-term hunting opportunity while minimizing regulatory change.** This goal takes the form of **three distinct objectives**:

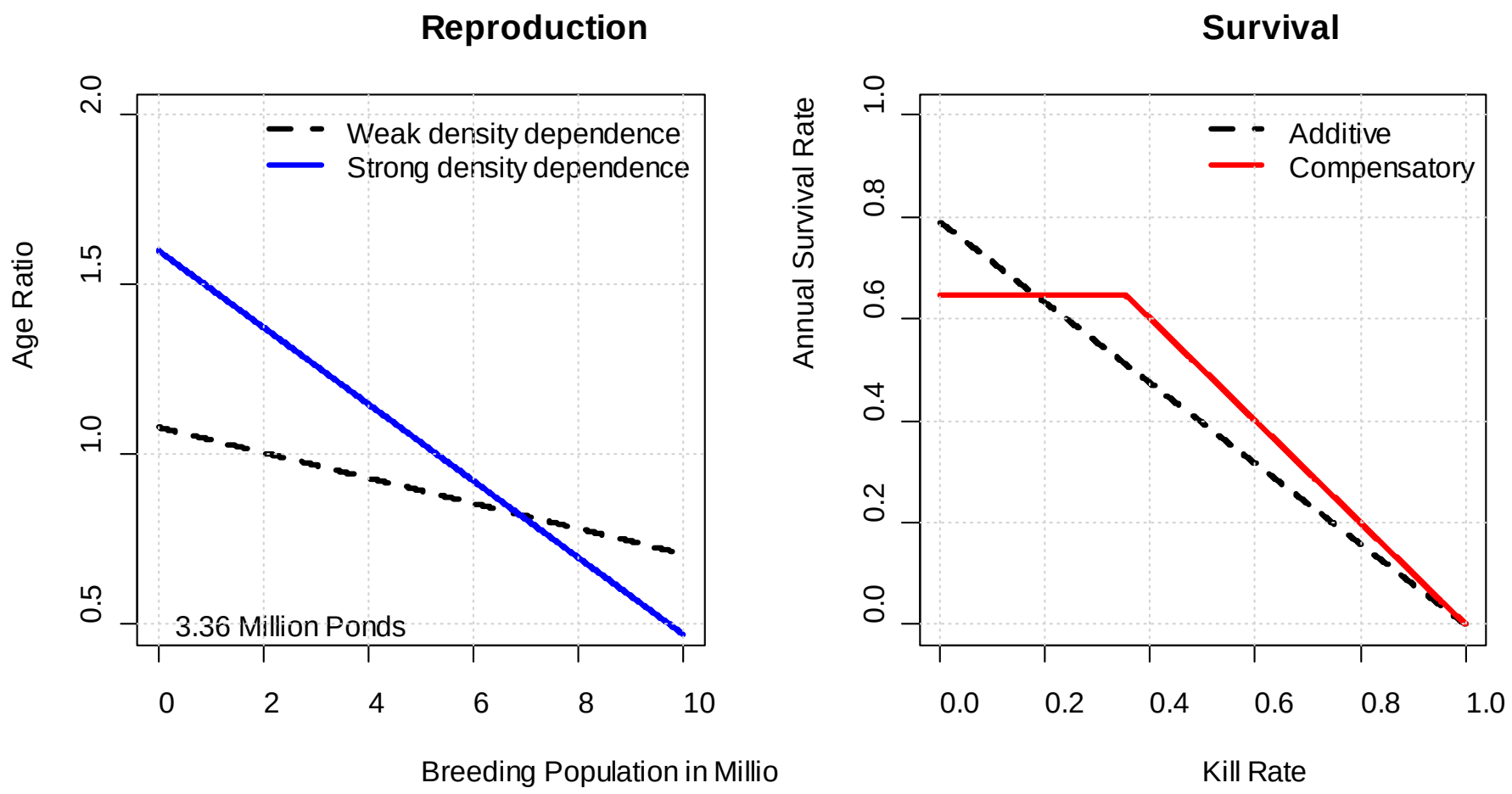
- **Maintain hunter numbers and effort at or above the 1999-2014 average** as measured by both total hunter numbers and hunter-days afield, reported in the annual HIP databook.
- **Maintain duck populations** sufficient to sustain hunting opportunity.
- Implement **policies and regulatory processes that are less resource intensive.**


Population Estimate (in Millions)
12
10
8
6
4
1955
1965
1975
1985
1995
2005
2015
Year

$$\sum_{t=0}^{\infty} H_t u(\hat{N}_{t+1}) \quad \text{where } u(\hat{N}_{t+1}) = \min(1, \hat{N}_{t+1} / \text{NAWMP Goal})$$



The AHM discrete model set.

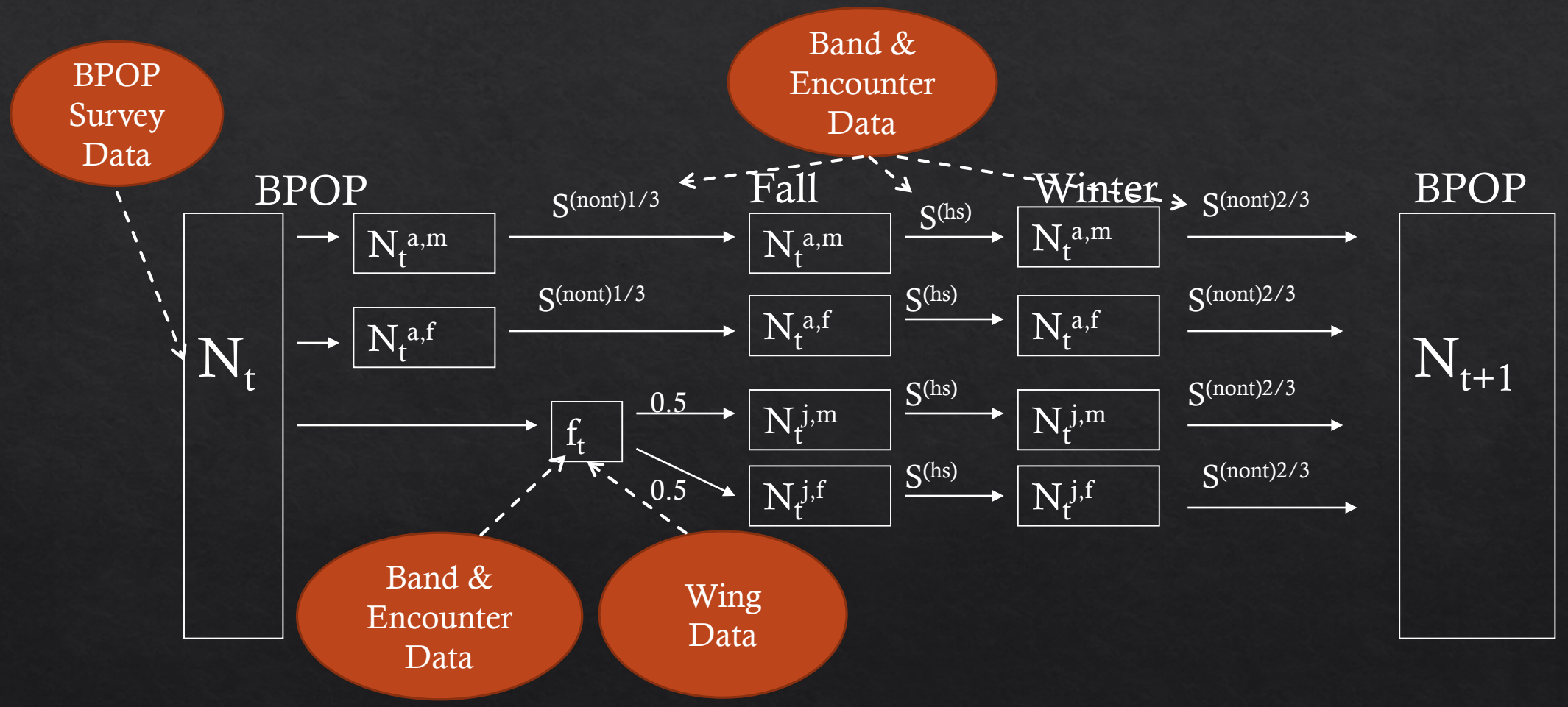


Updated Survival parameters

	Males		Females	
	2002	2016	2002	2016
S0.A	0.7896	0.8204	0.6886	0.6826
S0.C	0.6467	0.6918	0.5965	0.6107

Integrated Population Model

$$N_{t+1} = N_t(S_t + f_t S`_t)$$



Updated Survival parameters

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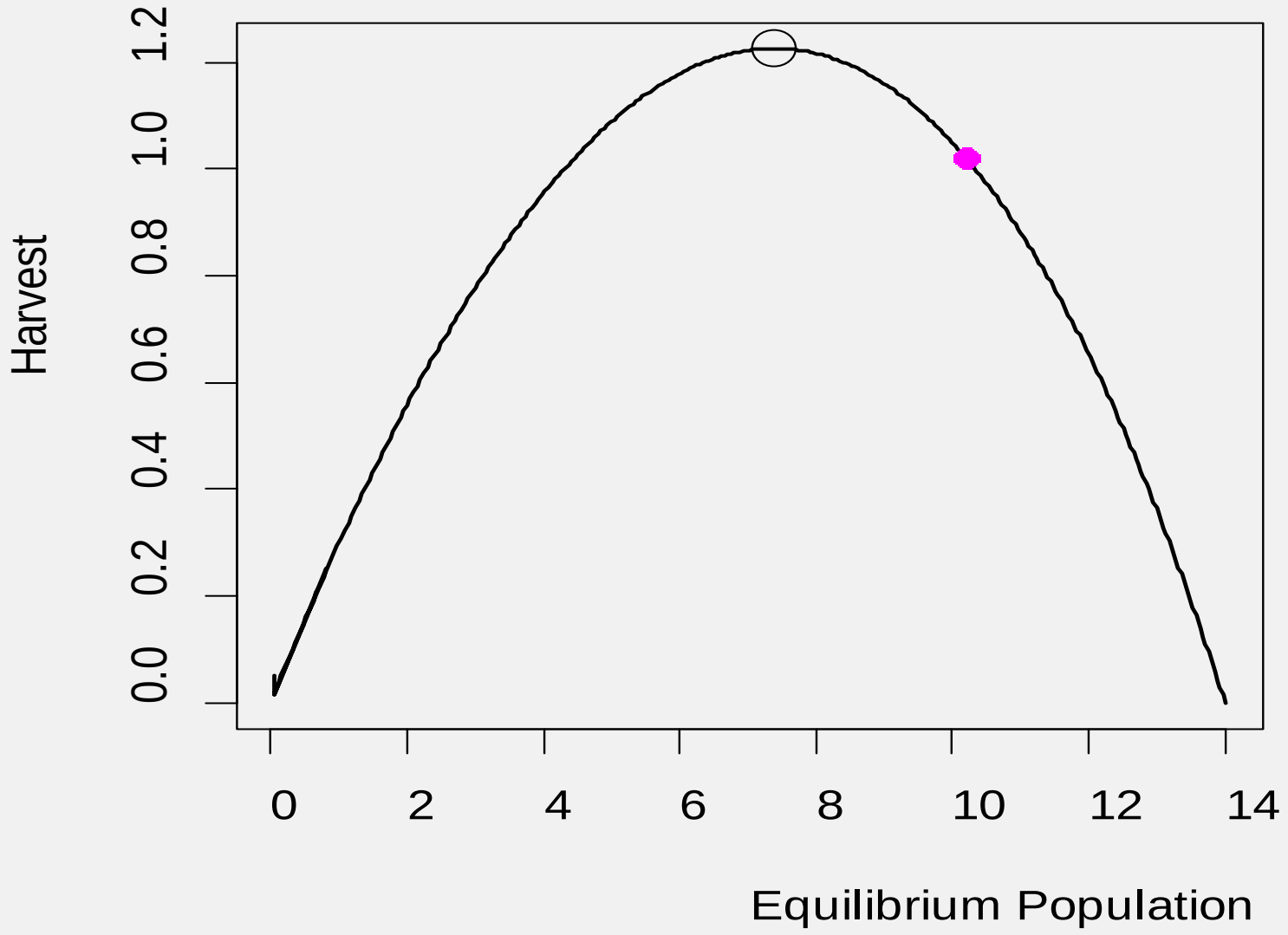
	2002	2016	2002	2016
S0.A	0.7896	0.8204	0.6886	0.6826
S0.C	0.6467	0.6918	0.5965	0.6107

Stan Output

	mean	se_mean	sd	2.5%	25%	50%	75%	97.5%	n_eff	Rhat
logit_a1	3.589	0.008	0.290	3.045	3.391	3.579	3.780	4.181	1204	1.001
nsur_am	0.782	0.000	0.006	0.771	0.778	0.782	0.786	0.795	1193	1.001
nsur_af	0.653	0.000	0.004	0.645	0.650	0.653	0.655	0.661	1319	1.000
nsur_jm	0.797	0.000	0.009	0.780	0.791	0.797	0.803	0.815	1283	1.001
nsur_jf	0.733	0.000	0.010	0.713	0.726	0.733	0.740	0.753	1991	1.000

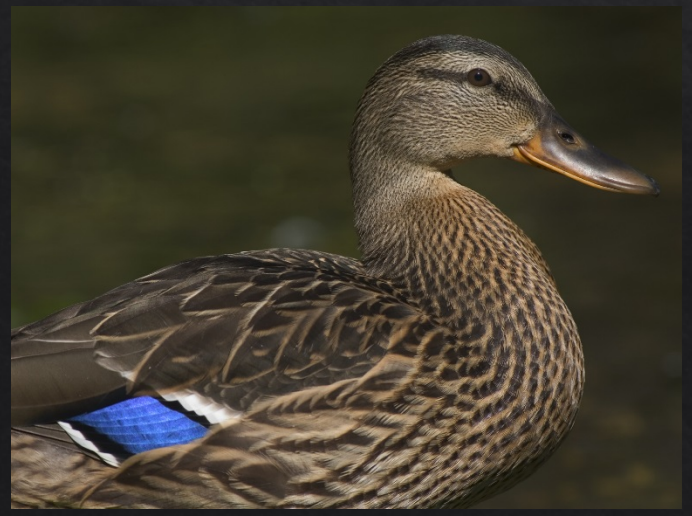
IPM Equilibrium Analysis




How much does waterfowl hunting mean to you?
EXIT

	MISSISSIPPI FLYWAY						CENTRAL FLYWAY				
Scenario	Liberal	Mod	Rest	Dux	Drakes	Other Spp	Liberal	Mod	Rest	Dux	Drakes
1	60	45	30	6	4	3	74	60	39	6	5
2	60	45	30	6	4	3	74	60	32	6	6
3	60	45	30	6	4	3	81	NA	46	6	6
4	60	45	30	6	4	3	81	60	32	6	6
5	60	45	30	6	4	3	74	NA	46	6	6
6	67	45	30	6	4	3	74	60	39	6	5
7	67	45	30	6	4	3	74	60	32	6	6
8	67	45	30	6	4	3	81	NA	46	6	6
9	67	45	30	6	4	3	81	60	32	6	6
10	67	45	30	6	4	3	74	NA	46	6	6
11	60	45	30	6	4	2	74	60	39	6	5
12	60	45	30	6	4	2	74	60	32	6	6
13	60	45	30	6	4	2	81	NA	46	6	6
14	60	45	30	6	4	2	81	60	32	6	6
15	60	45	30	6	4	2	74	NA	46	6	6
16	67	45	30	6	4	2	74	60	39	6	5
17	67	45	30	6	4	2	74	60	32	6	6
18	67	45	30	6	4	2	81	NA	46	6	6
19	67	45	30	6	4	2	81	60	32	6	6
20	67	45	30	6	4	2	74	NA	46	6	6

What are “other species”?



Open questions.