**Calculation of Wetland Base Lost, Annual Rates of Change, and Percentage of Winter Duck Population Objectives supported by 5 Priority Non-breeding JVs**

**(restricted to losses for natural wetlands only)**

**Summary Table**

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| --- | --- | --- | --- |
| Joint Venture | Historical Wetland Base Lost | ContemporaryAnnual Rate of Wetland Change | % of Autumn-Winter Duck Population Objectives1 |
| Gulf Coast2 | > −18% | − 0.33% | 8.5% |
| Central Valley3 | > −95% | + 1.00 % | 7.2% |
| Lower Miss Valley4 | > −75% | + 1.40% | 14.3% |
| Upper Miss / Great Lakes5 | > −63% | + 0.31% | 19.6% |
| Atlantic Coast6 | > −37% | − 0.14% | 12.3% |

**Justifications and Calculations**

1Percentages of total non-breeding population objectives calculated to reflect only dabblers and divers. Objectives used in these calculations were based on methods of Fleming et al. (2019) and applied to individual JVs based on methods described in the DU International Conservation Plan. Additionally, percentages were calculated after excluding objectives for prairie and boreal JVs, as they are recognized as areas of primary importance during the breeding season.

**2Gulf Coast**

Historical losses for the Gulf Coast are restricted to a more contemporary time frame spanning 1930s/1950s to the 2000s. It was not possible to use Dahl’s (1990) state-based estimates dating back to the 1780s because such a small portion of the states actually fall within the geography of the GCJV. Thus, calculations were restricted to publications and reports that measured wetland change only in the coastal area. Historical records and estimates for these coastal areas, especially for TX, MS, and AL, are limited or non-existent before the 1950s.

Coastal Texas: 4,105,343 ac in 1955; 3,894,753 in 1992; −210,590 ac (Moulton et al. 1997)

Coastal Louisiana: 4,857,609 ac in 1932; 3,573,398 in 2016; −1,284,211 ac (Couvillion et al. 2017)

Coastal MS (Mississippi Sound): 78,863 ac in 1979-82; 35,874 in 2007; −42,989 ac (Handley et al. 2015)

Coastal AL (Mobile Bay): 67,035 ac in 1955; 30,567 in 2001-02; −36,468 ac (Handley et al. 2015)

Total GCJV: −1,574,258 ac from 1932/55 through 1992/2016: −17%

Current annual rate of change, 2004–2009: (−257,153 ac / 5 yrs) / (15,668,626 ac) = −0.33% per year (Dahl and Stedman 2013)

Without question, the historical wetland losses calculated from relatively recent data vastly underestimate the loss of wetlands on the Gulf Coast since European settlement. Wetland scientists from Texas Parks and Wildlife Department have estimated the Texas coastal plain (i.e., coastal prairies) once contained approximately 2.5 million acres of prairie pothole wetlands, and the vast majority of these wetlands were converted to rice agriculture in the early 20th Century prior to modern aerial photography and wetland inventory techniques. Additionally, the sheer vastness of coastal wetlands in Louisiana masks the relative magnitude of wetland loss in other portions of the GCJV geography, such as the Texas Mid-Coast. Similarly, this same phenomenon masks the significance of wetland loss and conversion attributable to urban development in certain portions of the GCJV geography, most notably the Greater Houston Metropolitan Area (GHMA). For example, recent investigations estimated that across the entire 8 counties making up the GHMA, 5.5% of remaining freshwater wetlands were drained or converted over the period 1992–2010, for a 0.3% annual rate of loss (Jacob et al. 2014). However, Harris county, the most urbanized within the GHMA, experienced a 30% loss of remaining wetlands during this time frame, for a −1.6% annual rate of loss (Jacob et al. 2014).

**3Central Valley**

Per an e-mail forwarded by M. Petrie:

“The Central Valley once contained about 4,000,000 acres of wetlands, of which about 220,000 acres remain (almost all of which are managed).  This means about 95% of the historic habitat base has been lost.  Wetland restoration in the Central Valley (all partners) now averages about 2300 acres per year.  Thus, are annual rate of change is about a positive 1% a year (2,300/220,000).  Because over 90% of all remaining wetlands are protected, I assumed we are not losing much out the other end.”

**4Lower Mississippi Valley**

Historical loss estimate (> −75%) from MAV section in 2019 DU ICP, which cites MacDonald et al. (1979).

Current annual rate of change was based on contemporary forest classification by Mitchell et al. (2015) and the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative (GCPO LCC; 2016). Specifically, Mitchell et al. (2015) cited reforestation of 1,362,300 ac, with essentially all of this presumably occurring since 1985. If we assume relatively little additional deforestation since the mid-80s, these 1,362,300 ac should represent gains since the 1980s, which could thus be subtracted from the current estimate of forest extent to arrive at the extent of forest in the mid-80s. Mitchell et al. (2015) estimated 8,174,011 ac of total forest, but this likely overestimates the amount of wetland forest. A better estimate of extant forested wetland is likely represented by the 4,600,000 ac reported by the GCPO LCC (2016). Annual rate of change in waterfowl habitat in the MAV is provided by:

 [1,362,300/(4,600,000 – 1,362,300)] / 30 yrs = + 1.4%

**5Upper Miss/Great Lakes**

Historical loss estimate based on sum of historical losses of the following states as reported by Dahl (1990): IA, IL, IN, MI, MN, MO, OH, WI. Although portions of these states are outside the JV boundary, the resulting historical loss estimate varied little based on most combinations of which states were included vs. excluded because of this issue. This yielded a > −63% loss in historical wetland area.

Contemporary annual rate of change: + 0.3% (based on compilation of data from UM/GLJV BCR x State Plans for BCRs 22 and 23). (<https://umgljv.org/planning/state-by-bcr-plans/> as referenced in Soulliere et al. 2017)

**6Atlantic Coast**

Historical loss estimate based on sum of historical losses of the following states as reported by Dahl (1990): CT, DE, GA, MA, MD, ME, NC, NH, NJ, NY, RI, SC, VA, VT. Although portions of these states are outside the JV boundary, the resulting historical loss estimate varied little based on most combinations of which states were included vs. excluded because of this issue. This yielded a > −37% loss in historical wetland area.

Contemporary annual rate of change based on Dahl & Stedman (2013), which reflected only losses in coastal watersheds. For the Atlantic Coast, the percent change from 2004–2009 was −0.7%, which was annualized to −0.14%.

As for the Gulf Coast, estimates of wetland loss vary significantly across this region, with the magnitude of loss often greater near heavily urbanized landscapes.

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