

Analyses of Western Gulf Coast mottled duck harvest data
Khristi Wilkins
Division of Migratory Bird Management

SUMMARY

This report contains a summary of the recent analyses of data from mottled ducks harvested in Texas and Louisiana. These analyses were performed solely to allow biologists and managers to engage in more informed and productive discussions of mottled duck harvest management. Our goal was to determine what types of harvest restrictions would be necessary to achieve various levels of harvest reduction should restrictions be deemed necessary in the near future, given that no formal assessment framework currently exists to evaluate the harvest potential of Western Gulf Coast mottled ducks. Analyses by the Central Flyway and FWS suggest that the Hunter's Choice option that is currently being used in Texas may decrease harvest of mottled ducks by 18%. Analyses of harvest data in Louisiana presented at a workshop in April 2006 suggested that reducing the daily bag limit of mottled ducks from 3 → 2 birds/day would decrease the total harvest by 3%. Reducing from 3→1 birds/day was estimated to decrease mottled duck harvest in Louisiana by 19%. Recently, the FWS has examined the distribution of mottled duck harvest data from 1997/98-2005/06 to estimate how shortened seasons can be used to achieve harvest reductions. We estimated that current seasons would need to be shortened by 14 days in Texas and 15 days in Louisiana order to reduce harvest by an additional 10% in each state in addition to bag limit reductions in Louisiana and Hunter's Choice in Texas. If only reductions in season length were used to decrease harvest, we estimated that the hunting season would need to be decreased by 34 days in both Louisiana and Texas to decrease mottled duck harvest by 30%. This method likely overestimates the number of days that need to be cut from the season, because it assumes that hunter effort will not change during shorter seasons. However, we note that shorter seasons within longer seasons are highly undesirable by hunters, managers, and law enforcement, particularly in the case of mottled ducks, which look very similar to mallards. A season-within-a-season on mottled ducks would make it difficult for hunters to remain legal and law enforcement to enforce.

BACKGROUND

Biologists have been concerned about the status of mottled ducks since at least the late 1990's. This concern stems from negative trends in population survey data, loss and degradation of habitat, interbreeding with captive-reared and feral mallards, and increased harvest rates as the result of longer hunting seasons since 1997. Mottled ducks are distributed as 2 populations: a Florida population and Western Gulf Coast (WGC) population. Most WGC mottled ducks are found in Louisiana and Texas. Analyses of population survey and banding data suggest that the population of mottled ducks in Florida is stable or slightly declining, and the WGC population is declining in at least some areas, although the extent and magnitude of this decline is a matter of debate.

Current harvest regulations for mottled ducks are: (1) in Florida - a 60 day season with a 1 bird/day bag limit; (2) in Louisiana – a 60 day season with a 3-bird/day bag limit; and (3) in Texas – a 74 day season with a 1 bird/day bag limit. Season lengths for mottled

ducks have ranged from 30-60 days in Florida and Louisiana and 30-74 days in Texas. No changes in daily bag limits of mottled ducks have been implemented since the mid-1980's, when Florida (in 1984) and Texas (in 1985) decreased the daily bag limit from 2/day to 1/day.

Last summer, the Service Regulations Committee (SRC) asked the Division of Migratory Bird Management (DMBM) to work with biologists from Texas Parks and Wildlife Department and the Louisiana Department of Wildlife and Fisheries to identify a reasonable rate of harvest reduction, *should one be deemed necessary in the future*. A maximum reduction rate of 30% was suggested by the FWS, based on a comparison of historical harvest rates (1994-1996) and current (2002-2004) harvest rates. No changes in harvest regulations were implemented last year. During a briefing to the SRC in February 2007, DMBM repeated our concern about the status of mottled ducks, especially in the WGC, and said that we'd provide the Flyways with a report summarizing analyses of mottled duck harvest data that examines ways in which a harvest restriction might be implemented. The methods for harvest reduction that have been examined are: (1) bag limit restrictions in Louisiana, (2) Hunter's Choice system currently used in Texas, and (3) cutting days from the hunting season in both states.

ANALYSES

1. Relationship between bag limit and mottled duck harvest in Louisiana. Analysis by Ken Richkus (FWS) and Paul Padding (FWS), presented at mottled duck workshop in Lafayette, LA, April 2006.

All daily bags that contained mottled ducks in Louisiana from 1961-2005 were analyzed. Of these daily bags, 79% of the daily bags that contained mottled ducks contained 1 mottled duck, 18% contained 2 mottled ducks, and 3% contained 3 mottled ducks (Table 1).

Table 1. Frequency of mottled ducks in hunter bags in Louisiana, using FWS Part Collection Survey data from 1961/62-2004/05.

| Daily Bag | Total Bags | % | Cumulative % | No. of Ducks Shot | | | |
|-----------|------------|------|----------------------|-------------------|-------|------|-------|
| | | | | Total ducks | 1st | 2nd | 3rd |
| 1 | 2,099 | 79.3 | 79.3 | 2,099 | 2,099 | | |
| 2 | 464 | 17.5 | 96.8 | 928 | 464 | 464 | |
| 3 | 84 | 3.2 | 100.0 | 252 | 84 | 84 | 84 |
| Total | 2,647 | | | 3,279 | 2,647 | 548 | 84 |
| | | | % of total harvest | | 80.7 | 16.7 | 2.6 |
| | | | Cumulative % | | 80.7 | 97.4 | 100.0 |
| | | | Bag limit | 3 | 2 | 1 | 0 |
| | | | Expected % reduction | 0.0 | 2.6 | 19.3 | 100.0 |

Thus, a reduction in the daily bag limit in Louisiana from 3 to 2 birds is predicted to decrease the total harvest of mottled ducks in Louisiana by 3%, and a reduction from 3 to 1 bird is predicted to decrease harvest by 19%.

2. Expected effect of Hunter’s Choice on mottled duck harvest in Texas. Analysis by Ken Richkus (FWS), Paul Padding (FWS), and Bobby Cox (USGS), July 2007.

The Hunter’s Choice approach in the Central Flyway is a harvest regulations method designed to avoid the use of a short hunting season within the regular season (i.e., season-within-a-season; SWAS) as a method for limiting the harvest of particular species (e.g., canvasback, pintail). Hunters in states using the Hunter’s Choice system can shoot one bird from the “aggregate bag” consisting of either a hen mallard, pintail, canvasback, or mottled duck. Hunter’s Choice was implemented during the 2006/07 in 5 Central Flyway states, including Texas. Because this aggregate bag may change the size of the mottled duck harvest in Texas, data from the Parts Collection Survey were used to estimate the potential impact of Hunter’s Choice on mottled duck harvest. The species composition of the daily bags of waterfowl hunters in Texas from the 1998/99 - 2000/01 seasons were examined. Data were limited to these years because these were the most recent years during which the Central Flyway had full seasons on both pintails and canvasbacks, and daily species-specific bag limits remained constant. Regulations during these years were liberal, so results only apply to liberal seasons.

Of the 6,818 daily bags examined, 1,742 (25.6%) contained at least one species on the aggregate list, including 2,041 hen mallards, pintails, canvasbacks, and mottled ducks. Therefore in Texas, Hunter’s Choice has the potential to reduce harvest by an average of 14.6% ((2041-1742)/2041) across the aggregate species. The distribution of this reduction between species was calculated by examining the species composition of the 97 daily bags that included a mottled duck (Table 2). In total, the Hunter’s Choice option is projected to decrease mottled duck harvest in Texas by 18.4%. This calculation assumes that hunters are non-selective and harvest ducks as they are encountered.

Table 2. Projected decrease in mottled duck harvest in Texas due to the Hunter’s Choice option, using FWS Parts Collection Survey data from 1998/99-2000/01.

| Species composition of hunter bags that included 1 mottled duck | <i>n</i> | Expected reduction in mottled duck harvest from this combination of species |
|---|----------|---|
| 1 mottled duck + no species from the aggregate list | 62 | 0.0% |
| 1 mottled duck + 1 hen mallard | 3 | 1.5% ¹ |
| 1 mottled duck + 1 pintail | 30 | 15.5% ² |
| 1 mottled duck + 1 hen mallard + 1 pintail | 2 | 1.4% ³ |
| Total bags containing 1 mottled duck | 97 | 18.4% ⁴ |

¹ (3*0.5)/97

² (30*0.5)/97

³ (2*0.67)/97

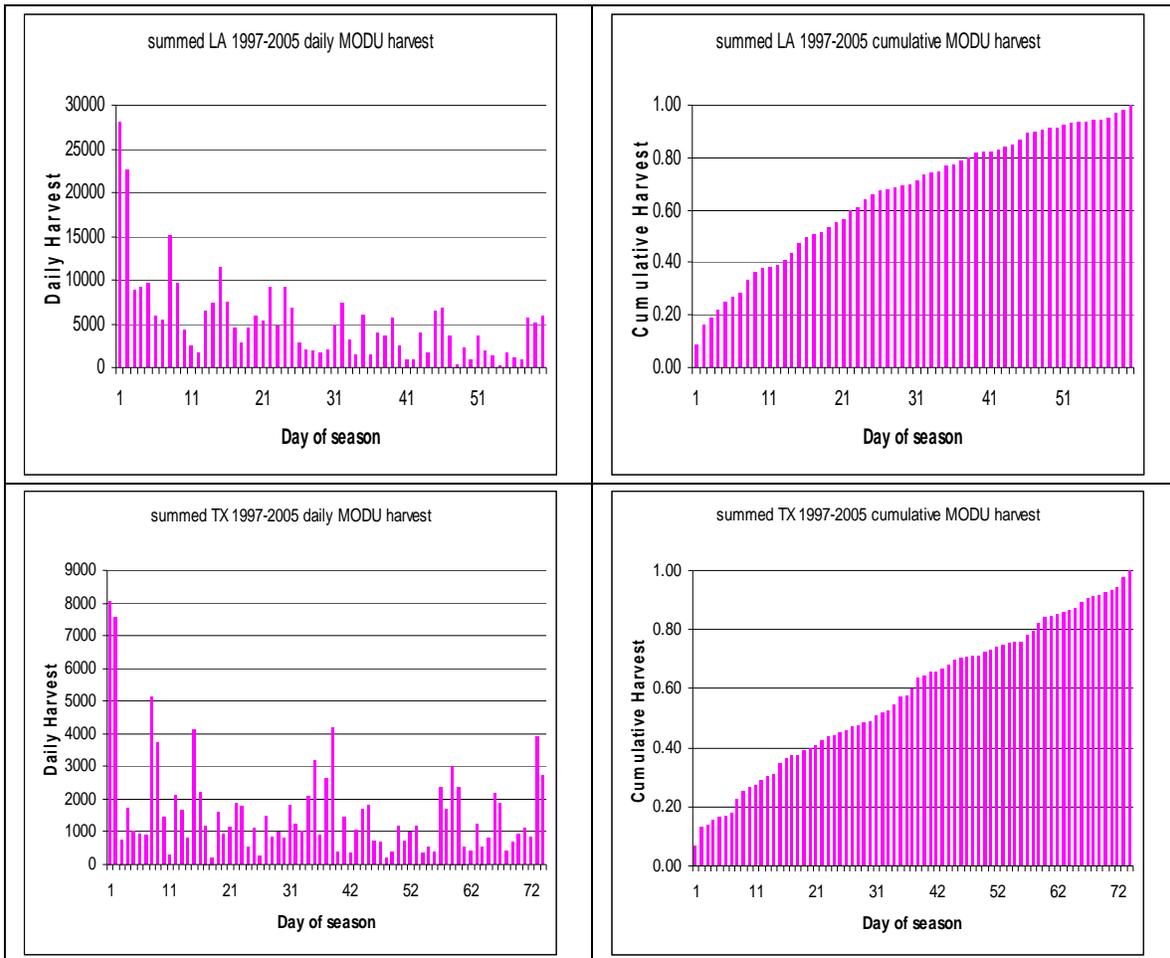
⁴ 1.5% + 15.5% + 1.4%

3. Daily distribution of mottled duck harvests in Louisiana and Texas. Analysis by Paul Padding (FWS) and Khristi Wilkins (FWS), February 2007.

To characterize the relationship between number of days in the hunting season and mottled duck harvest, we examined the distribution of mottled duck harvest in Louisiana and Texas by day of the season (e.g., 1st day of the season, 2nd day of the season, etc.). We used data from 1997/98-2005/06, because season lengths and bag limits did not change during this period. We assigned each day’s harvest to an ordinal day of the season. Hunting season splits and zones were taken into account by analyzing harvest at the county-level (Table A-1, Figure A-1).

We calculated the daily harvest for each ordinal day of the season for each year from 1997/98-2005/06, and averaged this across years. Harvest estimates were averaged across years because of small annual sample sizes on individual days. We plotted the average daily and cumulative harvest of mottled ducks by day of the season for Louisiana and Texas (Figure 1).

Figure 1. Average and cumulative daily mottled duck harvest in Louisiana and Texas by day of season, using FWS Parts Collection Survey data from 1997/98-2005/06.



The greatest numbers of mottled ducks were harvested on the first 2 days of the hunting season (i.e., “opening-day” effect). Daily harvest peaked every 5-6 days, likely because

of increased hunting activity on weekends. Hunting effort also increased on the last few days of the season (i.e., “closing-day” effect). Total mottled duck harvest accumulated more quickly in Louisiana than Texas, as shown by the number of days needed to achieve 20%-100% of the total harvest (Table 3, Table A-2).

Table 3. Average number of days of harvest to achieve 20%, 40%, 60%, 80%, and 100% of total mottled duck harvest in Louisiana and Texas, from FWS Parts Collection Survey data. Data averaged across 1997/98-2005/06 hunting seasons.

| Cumulative harvest | Louisiana | | Texas | |
|--------------------|---------------|-----------------------------------|---------------|-----------------------------------|
| | Day of season | Proportion of season ¹ | Day of season | Proportion of season ² |
| 20% | 3-4 | 5%-7% | 7-8 | 9%-11% |
| 40% | 12-13 | 20%-22% | 20 | 27% |
| 60% | 22 | 37% | 37 | 50% |
| 80% | 38 | 63% | 58 | 78% |
| 100% | 60 | 100% | 74 | 100% |

¹ day of season/60

² day of season/74

Using this method, we calculated that the hunting season would have to be shortened to 23 days in Louisiana (38% of the current regular season length) and to 38 days in Texas (51% of the current regular season length) to reduce mottled duck harvest by 30%. This calculation allows for a 2-day “closing-day” effect. If a shortened season was considered in addition to bag limit restrictions in Louisiana and Hunter’s Choice in Texas, we estimated that the hunting season would have to be reduced by 15 days in Louisiana and 14 days in Texas to decrease mottled duck harvest by an additional 10% (again, allowing for a 2-day “closing-day” effect). This method assumes that the change in harvest caused by reducing season length is independent of the reduction in harvest caused by lowering bag limit (in Louisiana) or Hunter’s Choice (in Texas). It also assumes that hunter effort will not change as the result of greatly shortened seasons. This is likely not true; therefore this method probably overestimates the number of days needed to reduce harvest when number of days is used as the sole means for harvest reduction.

CONCLUSIONS

A bag limit reduction in Louisiana from 3→1 bird is projected to decrease mottled duck harvest by almost 20%. The Hunter’s Choice program in Texas is also projected to decrease mottled duck harvest by almost 20%. In order to reach a maximum target harvest reduction of 30%, analyses of harvest data suggest that hunting seasons would have to be shortened by 15 days in Louisiana and 14 days in Texas *in addition to reduced bag limits in Louisiana and the Hunter’s Choice program in Texas*. If only shortened seasons were considered as the method for reducing mottled duck harvest, we calculated that the hunting season would have to be shortened by 34 days in Louisiana (43 of the current regular season length) and Texas (54% of the current regular season length) to reduce mottled duck harvest by 30%. This calculation allows for a 2-day “closing-day” effect.

ACTION NEEDED

The DMBM encourages the Central and Mississippi Flyways to discuss this assessment of regulatory options to achieve various levels of harvest reduction up to a maximum of 30%. The SRC has requested recommendations on options for restriction should a restriction be deemed necessary in the future, given that we currently lack an assessment framework for the WGC population that would allow for a more objective determination.

APPENDIX

Table A-1. Waterfowl hunting regulations in Louisiana and Texas 1997/98-2005/06.

| State | year | zone | Opening date of 1 st split | Closing date of 1 st split | Opening date of 2 nd split | Closing date of 2 nd split |
|-----------|------|-------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Louisiana | 1997 | West | 11/18/1997 | 11/30/1997 | 12/13/1997 | 1/18/1998 |
| Louisiana | 1998 | West | 11/17/1998 | 11/29/1998 | 12/12/1998 | 1/17/1999 |
| Louisiana | 1999 | West | 11/13/1999 | 11/28/1999 | 12/11/1999 | 1/23/2000 |
| Louisiana | 2000 | West | 11/11/2000 | 12/3/2000 | 12/16/2000 | 1/21/2001 |
| Louisiana | 2001 | West | 11/10/2001 | 12/2/2001 | 12/15/2001 | 1/20/2002 |
| Louisiana | 2002 | West | 11/9/2002 | 12/8/2002 | 12/21/2002 | 1/19/2003 |
| Louisiana | 2003 | West | 11/8/2003 | 11/30/2003 | 12/13/2003 | 1/18/2004 |
| Louisiana | 2004 | West | 11/13/2004 | 12/5/2004 | 12/18/2004 | 1/23/2005 |
| Louisiana | 2005 | West | 11/12/2005 | 12/4/2005 | 12/17/2005 | 1/22/2006 |
| Louisiana | 1997 | East and Catahoula Lake | 11/15/1997 | 12/14/1997 | 12/20/1997 | 1/18/1998 |
| Louisiana | 1998 | East and Catahoula Lake | 11/14/1998 | 12/6/1998 | 12/12/1998 | 1/17/1999 |
| Louisiana | 1999 | East and Catahoula Lake | 11/13/1999 | 11/28/1999 | 12/11/1999 | 1/23/2000 |
| Louisiana | 2000 | East and Catahoula Lake | 11/18/2000 | 12/3/2000 | 12/9/2000 | 1/21/2001 |
| Louisiana | 2001 | East and Catahoula Lake | 11/17/2001 | 12/2/2001 | 12/8/2001 | 1/20/2002 |
| Louisiana | 2002 | East and Catahoula Lake | 11/16/2002 | 12/1/2002 | 12/14/2002 | 1/26/2003 |
| Louisiana | 2003 | East and Catahoula Lake | 11/15/2003 | 11/30/2003 | 12/13/2003 | 1/25/2004 |
| Louisiana | 2004 | East and Catahoula Lake | 11/20/2004 | 12/5/2004 | 12/18/2004 | 1/30/2005 |
| Louisiana | 2005 | East and Catahoula Lake | 11/19/2005 | 12/4/2005 | 12/17/2005 | 1/29/2006 |
| Texas | 1997 | High Plains | 10/11/1997 | 10/14/1997 | 10/18/1997 | 1/18/1998 |
| Texas | 1998 | High Plains | 10/17/1998 | 10/20/1998 | 10/24/1998 | 1/17/1999 |
| Texas | 1999 | High Plains | 10/23/1999 | 10/26/1999 | 10/30/1999 | 1/23/2000 |
| Texas | 2000 | High Plains | 10/21/2000 | 10/23/2000 | 10/28/2000 | 1/21/2001 |
| Texas | 2001 | High Plains | 10/20/2001 | 10/22/2001 | 10/27/2001 | 1/20/2002 |
| Texas | 2002 | High Plains | 9/23/2002 | 9/29/2002 | 10/26/2002 | 1/22/2003 |
| Texas | 2003 | High Plains | 11/1/2003 | 1/25/2004 | | |
| Texas | 2004 | High Plains | 9/27/2004 | 10/4/2004 | 10/30/2004 | 1/25/2005 |
| Texas | 2005 | High Plains | 10/22/2005 | 10/23/2005 | 10/28/2005 | 1/29/2006 |
| Texas | 1997 | Northern Low Plains | 10/25/1997 | 11/2/1997 | 11/15/1997 | 1/18/1998 |
| Texas | 1998 | Northern Low Plains | 10/31/1998 | 11/8/1998 | 11/14/1998 | 1/17/1999 |
| Texas | 1999 | Northern Low Plains | 10/30/1999 | 10/31/1999 | 11/13/1999 | 1/23/2000 |
| Texas | 2000 | Northern Low Plains | 10/28/2000 | 10/29/2000 | 11/11/2000 | 1/21/2001 |
| Texas | 2001 | Northern Low Plains | 10/27/2001 | 10/28/2001 | 11/10/2001 | 1/20/2002 |
| Texas | 2002 | Northern Low Plains | 11/9/2002 | 11/10/2002 | 11/16/2002 | 1/26/2003 |
| Texas | 2003 | Northern Low Plains | 11/8/2003 | 11/9/2003 | 11/15/2003 | 1/25/2004 |
| Texas | 2004 | Northern Low Plains | 11/6/2004 | 11/28/2004 | 12/11/2004 | 1/30/2005 |
| Texas | 2005 | Northern Low Plains | 11/5/2005 | 11/27/2005 | 12/10/2005 | 1/29/2006 |
| Texas | 1997 | Southern Low Plains | 10/25/1997 | 11/30/1997 | 12/13/1997 | 1/18/1998 |
| Texas | 1998 | Southern Low Plains | 10/24/1998 | 11/29/1998 | 12/12/1998 | 1/17/1999 |
| Texas | 1999 | Southern Low Plains | 10/30/1999 | 11/28/1999 | 12/11/1999 | 1/23/2000 |
| Texas | 2000 | Southern Low Plains | 10/28/2000 | 11/26/2000 | 12/9/2000 | 1/21/2001 |
| Texas | 2001 | Southern Low Plains | 10/27/2001 | 11/25/2001 | 12/8/2001 | 1/20/2002 |
| Texas | 2002 | Southern Low Plains | 11/2/2002 | 12/1/2002 | 12/7/2002 | 1/19/2003 |
| Texas | 2003 | Southern Low Plains | 10/25/2003 | 10/26/2003 | 11/8/2003 | 1/18/2004 |
| Texas | 2004 | Southern Low Plains | 9/27/2004 | 10/3/2004 | 11/13/2004 | 1/18/2005 |
| Texas | 2005 | Southern Low Plains | 11/5/2005 | 11/25/2005 | 12/10/2005 | 1/29/2006 |

Figure A-1. Hunting zones in Louisiana and Texas.



From 2006-07 Texas Parks and Wildlife Hunting Digest:
http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_k0700_1014.pdf



From Louisiana Department of Wildlife and Fisheries website:
<http://www.wlf.louisiana.gov/hunting/seasons/migratoryandwaterfowl/>

Table A-2. Proportion of total mottled duck harvest in Louisiana and Texas achieved by ordinal day of season, summed over 1997/98 – 2005/06 hunting seasons.

| Day of season | Cumulative Harvest in Louisiana | Cumulative Harvest in Texas | Day of season | Cumulative Harvest in Louisiana | Cumulative Harvest in Texas |
|------------------|---------------------------------|-----------------------------|------------------|---------------------------------|-----------------------------|
| 1 st | 0.09 | 0.07 | 38 th | 0.80 | 0.64 |
| 2 nd | 0.16 | 0.13 | 39 th | 0.82 | 0.64 |
| 3 rd | 0.19 | 0.14 | 40 th | 0.82 | 0.64 |
| 4 th | 0.22 | 0.16 | 41 st | 0.83 | 0.66 |
| 5 th | 0.25 | 0.16 | 42 nd | 0.83 | 0.66 |
| 6 th | 0.27 | 0.17 | 43 rd | 0.84 | 0.67 |
| 7 th | 0.29 | 0.18 | 44 th | 0.85 | 0.68 |
| 8 th | 0.33 | 0.22 | 45 th | 0.87 | 0.70 |
| 9 th | 0.36 | 0.26 | 46 th | 0.89 | 0.70 |
| 10 th | 0.38 | 0.27 | 47 th | 0.90 | 0.71 |
| 11 th | 0.39 | 0.27 | 48 th | 0.90 | 0.71 |
| 12 th | 0.39 | 0.29 | 49 th | 0.91 | 0.71 |
| 13 th | 0.41 | 0.30 | 50 th | 0.91 | 0.73 |
| 14 th | 0.43 | 0.31 | 51 st | 0.92 | 0.73 |
| 15 th | 0.47 | 0.35 | 52 nd | 0.93 | 0.74 |
| 16 th | 0.49 | 0.37 | 53 rd | 0.93 | 0.75 |
| 17 th | 0.51 | 0.38 | 54 th | 0.94 | 0.75 |
| 18 th | 0.52 | 0.38 | 55 th | 0.94 | 0.76 |
| 19 th | 0.53 | 0.39 | 56 th | 0.94 | 0.76 |
| 20 th | 0.55 | 0.40 | 57 th | 0.95 | 0.78 |
| 21 st | 0.57 | 0.41 | 58 th | 0.97 | 0.80 |
| 22 nd | 0.60 | 0.43 | 59 th | 0.98 | 0.82 |
| 23 rd | 0.61 | 0.44 | 60 th | 1.00 | 0.84 |
| 24 th | 0.64 | 0.45 | 61 st | . | 0.85 |
| 25 th | 0.66 | 0.46 | 62 nd | . | 0.85 |
| 26 th | 0.67 | 0.46 | 63 rd | . | 0.86 |
| 27 th | 0.68 | 0.47 | 64 th | . | 0.87 |
| 28 th | 0.68 | 0.48 | 65 th | . | 0.87 |
| 29 th | 0.69 | 0.49 | 66 th | . | 0.89 |
| 30 th | 0.70 | 0.49 | 67 th | . | 0.91 |
| 31 st | 0.71 | 0.51 | 68 th | . | 0.91 |
| 32 nd | 0.73 | 0.52 | 69 th | . | 0.92 |
| 33 rd | 0.74 | 0.53 | 70 th | . | 0.93 |
| 34 th | 0.75 | 0.55 | 71 st | . | 0.94 |
| 35 th | 0.77 | 0.57 | 72 nd | . | 0.94 |
| 36 th | 0.77 | 0.58 | 73 rd | . | 0.98 |
| 37 th | 0.79 | 0.60 | 74 th | . | 1.00 |