

## Average NHC Eastern North Pacific Track Forecast Errors (n mi) All Tropical Cyclones<sup>1, 2</sup>

| Year | 0 h   |     | 12 h  |     | 24 h  |     | 36 h  |     | 48 h  |     | 72 h  |     | 96 h <sup>3</sup> |     | 120 h <sup>3</sup> |     |
|------|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------------------|-----|--------------------|-----|
|      | Error | N   | Error | N   | Error | N   | Error | N   | Error | N   | Error | N   | Error             | N   | Error              | N   |
| 1989 | 16.6  | 248 | 46.9  | 247 | 89.6  | 241 | 132.1 | 227 | 176.5 | 203 | 256.9 | 155 |                   |     |                    |     |
| 1990 | 14.1  | 566 | 41.9  | 548 | 76.8  | 519 | 113.4 | 474 | 152.4 | 437 | 216.1 | 364 |                   |     |                    |     |
| 1991 | 14.2  | 420 | 39.5  | 407 | 73.2  | 376 | 110.1 | 351 | 145.0 | 325 | 206.7 | 278 |                   |     |                    |     |
| 1992 | 23.8  | 675 | 39.9  | 651 | 73.5  | 615 | 108.8 | 561 | 144.7 | 519 | 211.4 | 432 |                   |     |                    |     |
| 1993 | 11.4  | 391 | 41.5  | 376 | 77.8  | 349 | 113.2 | 318 | 147.0 | 295 | 209.1 | 247 |                   |     |                    |     |
| 1994 | 13.0  | 322 | 40.3  | 304 | 77.0  | 280 | 111.8 | 258 | 143.3 | 234 | 201.5 | 187 |                   |     |                    |     |
| 1995 | 12.3  | 265 | 39.3  | 252 | 76.5  | 232 | 115.2 | 211 | 148.2 | 189 | 190.2 | 149 |                   |     |                    |     |
| 1996 | 15.9  | 219 | 44.7  | 202 | 76.5  | 179 | 102.4 | 148 | 122.6 | 122 | 184.8 | 86  |                   |     |                    |     |
| 1997 | 12.1  | 390 | 38.7  | 370 | 75.3  | 336 | 113.5 | 294 | 150.8 | 256 | 224.7 | 197 |                   |     |                    |     |
| 1998 | 10.3  | 321 | 36.3  | 306 | 70.5  | 281 | 104.7 | 257 | 132.1 | 231 | 183.0 | 187 |                   |     |                    |     |
| 1999 | 10.5  | 204 | 36.1  | 189 | 62.6  | 165 | 87.8  | 144 | 112.4 | 126 | 155.6 | 102 |                   |     |                    |     |
| 2000 | 10.8  | 328 | 36.0  | 298 | 66.1  | 266 | 93.5  | 236 | 114.9 | 205 | 161.7 | 151 |                   |     |                    |     |
| 2001 | 10.2  | 321 | 38.7  | 292 | 68.5  | 262 | 92.1  | 234 | 115.2 | 208 | 163.5 | 156 | 202.1             | 107 | 218.9              | 73  |
| 2002 | 8.6   | 301 | 36.4  | 275 | 59.6  | 245 | 81.4  | 216 | 99.0  | 188 | 137.4 | 143 | 191.4             | 103 | 227.9              | 70  |
| 2003 | 9.7   | 287 | 35.6  | 258 | 64.3  | 228 | 91.4  | 198 | 116.1 | 169 | 173.0 | 118 | 248.2             | 73  | 340.0              | 36  |
| 2004 | 8.5   | 239 | 30.5  | 212 | 51.9  | 184 | 72.7  | 158 | 93.0  | 135 | 136.3 | 97  | 201.4             | 72  | 308.0              | 45  |
| 2005 | 9.1   | 290 | 33.0  | 263 | 53.4  | 233 | 71.7  | 203 | 86.2  | 177 | 112.4 | 138 | 138.4             | 110 | 160.6              | 89  |
| 2006 | 8.8   | 379 | 30.2  | 341 | 54.5  | 302 | 77.4  | 264 | 99.7  | 228 | 142.3 | 159 | 186.1             | 107 | 227.5              | 71  |
| 2007 | 10.2  | 233 | 30.0  | 208 | 50.2  | 182 | 71.4  | 156 | 92.5  | 140 | 117.2 | 108 | 146.9             | 77  | 186.3              | 52  |
| 2008 | 10.7  | 311 | 30.9  | 275 | 47.5  | 239 | 63.7  | 205 | 78.0  | 175 | 107.6 | 124 | 138.8             | 85  | 161.4              | 53  |
| 2009 | 9.7   | 268 | 29.5  | 236 | 50.9  | 204 | 71.9  | 173 | 89.0  | 143 | 119.2 | 99  | 162.5             | 69  | 240.4              | 45  |
| 2010 | 9.0   | 161 | 26.0  | 138 | 40.1  | 115 | 48.6  | 97  | 54.7  | 83  | 85.3  | 63  | 119.3             | 43  | 145.4              | 29  |
| 2011 | 9.7   | 258 | 25.1  | 234 | 40.4  | 213 | 53.2  | 193 | 68.6  | 171 | 103.3 | 129 | 149.2             | 93  | 166.1              | 58  |
| 2012 | 9.2   | 310 | 23.2  | 278 | 36.1  | 246 | 49.2  | 214 | 63.8  | 183 | 88.6  | 125 | 107.6             | 76  | 100.7              | 39  |
| 2013 | 12.1  | 288 | 25.3  | 255 | 40.2  | 222 | 51.3  | 189 | 63.1  | 159 | 89.9  | 111 | 125.5             | 78  | 166.6              | 56  |
| 2014 | 7.6   | 439 | 20.3  | 405 | 29.9  | 367 | 38.5  | 327 | 50.1  | 293 | 82.4  | 237 | 119.4             | 188 | 177.0              | 136 |

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|----------------------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------------------|------|--------------------|-----|
|                      | Error | N    | Error | N    | Error | N    | Error | N    | Error | N    | Error | N    | Error             | N    | Error              | N   |
| 2015                 | 8.9   | 350  | 25.5  | 319  | 38.1  | 288  | 49.4  | 260  | 60.2  | 234  | 85.1  | 188  | 117.8             | 146  | 159.5              | 115 |
| 2016                 | 7.7   | 391  | 18.5  | 359  | 28.7  | 323  | 37.4  | 288  | 46.1  | 256  | 63.7  | 196  | 82.5              | 154  | 104.2              | 119 |
| 2017                 | 8.3   | 334  | 20.7  | 297  | 31.9  | 260  | 43.1  | 226  | 55.7  | 199  | 84.5  | 159  | 108.0             | 120  | 136.0              | 86  |
| 2018                 | 7.4   | 450  | 20.5  | 413  | 32.3  | 373  | 42.0  | 337  | 49.6  | 300  | 66.9  | 242  | 82.8              | 196  | 102.7              | 160 |
| 2019                 | 8.4   | 278  | 24.8  | 245  | 40.3  | 211  | 57.4  | 180  | 74.3  | 155  | 99.7  | 116  | 123.6             | 86   | 134.4              | 62  |
| 2020                 | 8.6   | 255  | 23.9  | 217  | 35.6  | 178  | 46.2  | 149  | 57.5  | 125  | 81.7  | 83   | 111.0             | 49   | 150.0              | 31  |
| 2021                 | 9.3   | 314  | 21.8  | 275  | 31.4  | 235  | 42.4  | 197  | 53.7  | 161  | 77.6  | 108  | 90.1              | 68   | 113.7              | 43  |
| 2022                 | 7.4   | 354  | 21.3  | 318  | 32.7  | 283  | 42.9  | 249  | 52.4  | 217  | 80.1  | 160  | 115.1             | 109  | 125.6              | 66  |
| 1990-99              | 14.7  | 3773 | 40.0  | 3605 | 74.5  | 3332 | 109.6 | 3016 | 143.4 | 2734 | 204.3 | 2229 |                   |      |                    |     |
| 2000-09 <sup>3</sup> | 9.6   | 2957 | 33.3  | 2658 | 57.2  | 2345 | 79.5  | 2043 | 99.3  | 1768 | 138.5 | 1293 | 178.6             | 803  | 220.1              | 534 |
| 2010-19              | 8.6   | 3263 | 22.5  | 2949 | 34.9  | 2626 | 45.7  | 2321 | 57.0  | 2045 | 82.1  | 1578 | 109.2             | 1192 | 136.9              | 871 |
| 2020-22              | 8.3   | 923  | 22.0  | 810  | 33.0  | 696  | 44.0  | 595  | 54.4  | 503  | 80.3  | 351  | 107.9             | 226  | 129.6              | 140 |

Notes:

1. Verification based on NHC best track database as of 4/24/23.
2. Verification sample is homogeneous with best-track 5-day CLIPER, and includes subtropical cyclones.
3. 96- and 120-h forecasts began in 2001, but were not publicly released until 2003.