Supplementary Material

Food Supplementation Increases Reproductive Performance of Ospreys in The Lower Chesapeake Bay Michael H. Academia\*, Bryan D. Watts

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# Appendices

Appendix 1. Prey composition and provisioning rates of the control nests under trail camera surveillance (N = 4) during the 2021 osprey breeding season in the lower Chesapeake Bay, VA, USA.

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|  | **CONTROL** | | | |
| **SPECIES** | NO. | % TOTAL | BIOMASS (g) | KCAL |
| largemouth bass (*Micropterus salmoides)* | 0 | 0 | 0 | 0 |
| Atlantic croaker (*Micropogonias undulatus)* | 17 | 7.3 | 740.6 | 740.6 |
| Atlantic cutlassfish (*Trichiurus lepturus)* | 1 | 0.4 | 97.2 | 97.2 |
| Atlantic herring (*Clupea harengus)* | 13 | 5.6 | 365.6 | 365.6 |
| Atlantic menhaden (Brevoortia tyrannus) | 67 | 28.9 | 12082.2 | 22830.0 |
| Atlantic needlefish (*Strongylura marina*) | 1 | 0.4 | 301.3 | 301.3 |
| black drum (*Pogonias cromis)* | 2 | 0.9 | 89.7 | 89.7 |
| bluefish (*Pomatomus saltatrix)* | 2 | 0.9 | 806.3 | 806.3 |
| catfish (*Ictaluridae)* | 0 | 0 | 0 | 0 |
| gizzard shad (*Dorosoma cepedianum)* | 13 | 5.6 | 4331.3 | 8662.5 |
| oyster toadfish (*Opsanus tau)* | 0 | 0 | 0 | 0 |
| red drum (*Scianeops ocellatus)* | 1 | 0.4 | 279.9 | 279.9 |
| sculpin (*Cottoidea)* | 0 | 0 | 0 | 0 |
| spadefish (*Chaetodipterus faber)* | 5 | 2.2 | 387.8 | 387.8 |
| Spanish mackerel (*Scomberomorus maculatus)* | 8 | 3.4 | 3004.1 | 3004.1 |
| spot (*Leiostomus xanthurus)* | 17 | 7.3 | 966.6 | 966.6 |
| spotted seatrout (*Cynoscion nebulosus)* | 12 | 5.2 | 3973.1 | 3933.4 |
| striped bass (*Morone saxatilis)* | 7 | 3.0 | 2632.6 | 2422.0 |
| summer flounder (*Paralichthys dentatus)* | 9 | 3.9 | 528.0 | 443.5 |
| unknown | 55 | 23.7 | 1761.8 | 1761.8 |
| weakfish (*Cynoscion regalis)* | 1 | 0.4 | 131.7 | 130.4 |
| white perch (*Morone americana)* | 1 | 0.4 | 210.9 | 248.9 |
| TOTAL | 232 |  | 32690.7 | 47471.6 |
| AVERAGE P DAY | 4.7 |  | 667.16 | 968.81 |
| AVERAGE P DAY P NEST | 1.2 |  | 166.8 | 242.2 |

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|  | **TREATMENT** | | | | | | |
| **SPECIES** | NO. | ADDED | % TOTAL | % ADDED | BIOMASS (g) | ADDED | KCAL |
| largemouth bass (*Micropterus salmoides)* | 1 |  | 0.3 |  | 249.4 |  | 294.2 |
| Atlantic croaker (*Micropogonias undulatus)* | 18 |  | 4.9 |  | 562.1 |  | 562.1 |
| Atlantic cutlassfish (*Trichiurus lepturus)* | 1 |  | 0.3 |  | 2287.3 |  | 2287.3 |
| Atlantic herring (*Clupea harengus)* | 49 |  | 13.3 |  | 1574.6 |  | 1574.6 |
| Atlantic menhaden (Brevoortia tyrannus) | 165 | 241 | 44.8 | 40.0 | 28986.6 | 32384.5 | 54772.2 |
| Atlantic needlefish (*Strongylura marina*) | 0 |  | 0 |  | 0 |  | 0 |
| black drum (*Pogonias cromis)* | 0 |  | 0 |  | 0 |  | 0 |
| bluefish (*Pomatomus saltatrix)* | 1 |  | 0.3 |  | 550.2 |  | 550.2 |
| catfish (*Ictaluridae)* | 1 |  | 0.3 |  | 206.6 |  | 212.8 |
| gizzard shad (*Dorosoma cepedianum)* | 21 |  | 5.7 |  | 3603.4 |  | 7206.8 |
| oyster toadfish (*Opsanus tau)* | 1 |  | 0.3 |  | 75.0 |  | 75.0 |
| red drum (*Scianeops ocellatus)* | 1 |  | 0.3 |  | 444.8 |  | 444.8 |
| sculpin (*Cottoidea)* | 2 |  | 0.5 |  | 116.6 |  | 116.6 |
| spadefish (*Chaetodipterus faber)* | 1 |  | 0.3 |  | 257.0 |  | 257.0 |
| Spanish mackerel (*Scomberomorus maculatus)* | 1 |  | 0.3 |  | 6.6 |  | 6.6 |
| spot (*Leiostomus xanthurus)* | 13 |  | 3.5 |  | 566.7 |  | 566.7 |
| spotted seatrout (*Cynoscion nebulosus)* | 12 |  | 3.3 |  | 2819.5 |  | 2791.3 |
| striped bass (*Morone saxatilis)* | 9 |  | 2.4 |  | 614.0 |  | 564.8 |
| summer flounder (*Paralichthys dentatus)* | 6 |  | 1.6 |  | 396.4 |  | 333.0 |
| unknown | 61 |  | 16.6 |  | 1572.2 |  | 1572.2 |
| weakfish (*Cynoscion regalis)* | 0 |  | 0.0 |  | 0 |  | 0 |
| white perch (*Morone americana)* | 4 |  | 1.1 |  | 414.8 |  | 489.4 |
| TOTAL | 368 |  |  |  | 45303.7 |  | 74677.7 |
| **TOTAL w/ ADDED** | **609** |  |  |  | **77688.2** |  | **135884.4** |
| AVERAGE P DAY | 7.5 |  |  |  | 924.6 |  | 1524.0 |
| **AVERAGE P DAY w/ ADDED** | **12.4** |  |  |  | **1585.5** |  | **2773.2** |
| AVERAGE P DAY P NEST | 1.1 |  |  |  | 132.1 |  | 217.7 |
| **AVERAGE P DAY P NEST w/ ADDED** | **1.8** |  |  |  | **226.5** |  | **396.2** |

Appendix 1. Prey composition and provisioning rates of the treatment nests under trail camera surveillance (N = 7) during the 2021 osprey breeding season in the lower Chesapeake Bay, VA, USA.

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|  | **TOTAL** | | | | | |
| **SPECIES** | NO. | ADDED | % TOTAL | % ADDED | BIOMASS (g) | KCAL |
| largemouth bass (*Micropterus salmoides)* | 1 |  | 0.4 |  | 249.4 | 294.2 |
| Atlantic croaker (*Micropogonias undulatus)* | 35 |  | 15.1 |  | 1302.8 | 1302.8 |
| Atlantic cutlassfish (*Trichiurus lepturus)* | 2 |  | 0.9 |  | 2384.6 | 2384.6 |
| Atlantic herring (*Clupea harengus)* | 62 |  | 26.7 |  | 1940.2 | 1940.2 |
| Atlantic menhaden (Brevoortia tyrannus) | 232 | 241 | 100.0 | 29.0 | 41068.7 | 77602.2 |
| Atlantic needlefish (*Strongylura marina*) | 1 |  | 0.4 |  | 301.3 | 301.3 |
| black drum (*Pogonias cromis)* | 2 |  | 0.9 |  | 89.7 | 89.7 |
| bluefish (*Pomatomus saltatrix)* | 3 |  | 1.3 |  | 1356.5 | 1356.5 |
| catfish (*Ictaluridae)* | 1 |  | 0.4 |  | 206.6 | 212.8 |
| gizzard shad (*Dorosoma cepedianum)* | 34 |  | 14.7 |  | 7934.7 | 15869.3 |
| oyster toadfish (*Opsanus tau)* | 1 |  | 0.4 |  | 75.0 | 75.0 |
| red drum (*Scianeops ocellatus)* | 2 |  | 0.9 |  | 724.7 | 724.7 |
| sculpin (*Cottoidea)* | 2 |  | 0.9 |  | 116.6 | 116.6 |
| spadefish (*Chaetodipterus faber)* | 6 |  | 2.6 |  | 644.8 | 644.8 |
| Spanish mackerel (*Scomberomorus maculatus)* | 9 |  | 3.9 |  | 3010.7 | 3010.7 |
| spot (*Leiostomus xanthurus)* | 30 |  | 12.9 |  | 1533.4 | 1533.4 |
| spotted seatrout (*Cynoscion nebulosus)* | 24 |  | 10.3 |  | 6792.6 | 6724.7 |
| striped bass (*Morone saxatilis)* | 16 |  | 6.9 |  | 3246.5 | 2986.8 |
| summer flounder (*Paralichthys dentatus)* | 15 |  | 6.5 |  | 924.4 | 776.5 |
| unknown | 116 |  | 50.0 |  | 3334.0 | 3334.0 |
| weakfish (*Cynoscion regalis)* | 1 |  | 0.4 |  | 131.7 | 130.4 |
| white perch (*Morone americana)* | 5 |  | 2.2 |  | 625.7 | 738.3 |
| TOTAL | 600 |  |  |  | 77994.4 | 122149.3 |
| **TOTAL w/ ADDED** | **841** |  |  |  | **110378.9** | **183356.0** |
| AVERAGE P DAY | 12.2 |  |  |  | 1591.8 | 2492.8 |
| **AVERAGE P DAY w/ ADDED** | **17.2** |  |  |  | **2252.6** | **3742.0** |
| AVERAGE P DAY P NEST | 1.1 |  |  |  | 144.7 | 226.6 |
| **AVERAGE P DAY P NEST w/ ADDED** | **1.7** |  |  |  | **204.8** | **340.2** |

Appendix 1. Prey composition and provisioning rates of the total nests under trail camera surveillance (N = 11) during the 2021 osprey breeding season in the lower Chesapeake Bay, VA, USA.

Appendix 2. Length-weight conversion equations for all taxa identified in the osprey diet during the 2021 breeding season in the lower Chesapeake Bay.

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| SPECIES | BIOMASS CONVERSION | REFERENCE |
| Atlantic croaker (*Micropogonias undulatus)* | M = 0.0052\*L3.148 | Wilk et al. 1978 |
| Atlantic cutlassfish (*Trichiurus lepturus)* | M = 0.001\*L3.40 | https://fishbase.in/ |
| Atlantic herring (*Clupea harengus)* | M = 0.0075\*L3.03 | Hubold 1978 |
| Atlantic menhaden (*Brevoortia tyrannus)* | M = 0.0191\*L3.00 | June and Nicholson 1964 |
| Atlantic needlefish (*Strongylura marina)* | M = 0.011\*L3.108 | https://fishbase.in/ |
| black drum (*Pogonias cromis)* | M = 0.0114\*L3.05 | https://fishbase.in/ |
| bluefish (*Pomatomus saltatrix)* | M = 0.0281\*L2.80 | https://fishbase.in/ |
| catfish (*Ictaluridae)* | M = 0.0185\*L3.00 | Crawford 1993 |
| gizzard shad (*Dorosoma cepedianum)* | M = 0.0182\*L2.89 | Lagler and Van Meter 1951 |
| largemouth bass (*Micropterus salmoides)* | M = 0.0158\*L2.96 | Swingle 1965 |
| oyster toadfish (*Opsanus tau)* | M = 0.0068\*L3.16 | https://fishbase.in/ |
| red drum (*Scianeops ocellatus)* | M = 0.01001\*L3.028 | https://fishbase.in/ |
| sculpin (*Cottoidea)* | used oyster toadfish | https://fishbase.in/ |
| spadefish (*Chaetodipterus faber)* | M = 0.0926\*L2.684 | https://fishbase.in/ |
| spanish mackerel (*Scomberomorus maculatus)* | M = 0.0884\*L2.982 | https://fishbase.in/ |
| spot (*Leiostomus xanthurus)* | M = 0.0092\*L3.072 | Dawson 1965 |
| spotted seatrout (*Cynoscion nebulosus)* | M = 0.0131\*L3.000 | Crawford 1993 |
| striped bass (*Morone saxatilis)* | M = 0.0061\*L3.153 | Mansueti 1961 |
| summer flounder (*Paralichthys dentatus)* | M = 0.0102\*L2.994 | Smith and Daiber 1977 |
| unknown | used Atlantic herring | https://fishbase.in/ |
| weakfish (*Cynoscion regalis)* | M = 0.0088\*L3.000 | Crozier and Hecht 1913 |
| white perch (*Morone americana)* | M = 0.0125\*L3.020 | St. Pierre and Davis 1972 |

Appendix 3. Mass-energy conversion equations for all taxa identified in the osprey diet during the 2021 breeding season in the lower Chesapeake Bay.

|  |  |  |
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| SPECIES | ENERGY CONVERSION | REFERENCE |
| Atlantic croaker (*Micropogonias undulatus)* | E = 100\*(M/100) | Frimodt 1995 |
| Atlantic cutlassfish (*Trichiurus lepturus)* | used Atlantic herring |  |
| Atlantic herring (*Clupea harengus)* | E = 190\*(M/190) | Frimodt 1995 |
| Atlantic menhaden (*Brevoortia tyrannus)* | E = 189\*(M/100) | Frimodt 1995 |
| Atlantic needlefish (*Strongylura marina)* | used Atlantic herring |  |
| black drum (*Pogonias cromis)* | used Atlantic croaker |  |
| bluefish (*Pomatomus saltatrix)* | used Atlantic herring |  |
| catfish (*Ictaluridae)* | E = 103\*(M/100) | Frimodt 1995 |
| gizzard shad (*Dorosoma cepedianum)* | E = 200\*(M/100) | Watt and Merrill 1975 |
| largemouth bass (*Micropterus salmoides)* | used white perch |  |
| oyster toadfish (*Opsanus tau)* | used summer flounder |  |
| red drum (*Scianeops ocellatus)* | used Atlantic croaker |  |
| sculpin (*Cottoidea)* | used summer flounder |  |
| spadefish (*Chaetodipterus faber)* | used Atlantic croaker |  |
| Spanish mackerel (*Scomberomorus maculatus)* | used Atlantic herring |  |
| spot (*Leiostomus xanthurus)* | used Atlantic croaker |  |
| spotted seatrout (*Cynoscion nebulosus)* | E = 99\*(M/100) | Frimodt 1995 |
| striped bass (*Morone saxatilis)* | E = 92\*(M/100) | Frimodt 1995 |
| summer flounder (*Paralichthys dentatus)* | E = 84\*(M/100) | Frimodt 1995 |
| unknown | used Atlantic herring |  |
| weakfish (*Cynoscion regalis)* | E = 99\*(M/100) | Frimodt 1995 |
| white perch (*Morone americana)* | E = 118\*(M/100) | Watt and Merrill 1975 |