

Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.



## **The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods**

Moira M. Tidball<sup>1</sup>, Keith G. Tidball<sup>2</sup>, and Paul Curtis<sup>3</sup>

---

<sup>1</sup> Cornell Cooperative Extension of Seneca County, NY [mmt65@cornell.edu](mailto:mmt65@cornell.edu)

<sup>2</sup> Cornell University, Department of Natural Resources, Civic Ecology Lab [KGTidball@cornell.edu](mailto:KGTidball@cornell.edu)

<sup>3</sup> Cornell University, Department of Natural Resources [pdcl@cornell.edu](mailto:pdcl@cornell.edu)

Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.

## **Abstract**

We highlighted gaps in nutritional data for wild game meat and wild caught fish that have a regulated harvesting season in New York State, and examined the possible role that wild game and fish play in current trends towards consumption of local, healthy meat sources. This project is part of larger study that examines family food decision-making, and explores possibilities for leveraging the locavore movement in support of consumption of wild game and fish.

## **Keywords**

local food, wild fish, wild game, nutritional analysis, meat consumption, National Nutrient Database for Standard Reference, hunting, fishing

## **Background**

For the past 100 years, American's consumption of meat has dramatically increased, according to USDA's Economic Research Service (Putnam 2000; Putnam and Gerrior 1999). In the 1970-80's, chicken became a popular meat option because it has less saturated fat than beef, and was therefore deemed healthier as promoted by various diet plans and so-called health gurus (Wang et al. 2010; Putnam 2000; Daniel et al. 2011). Then, pork began to be marketed as the "other white meat" to indicate that pork, like chicken, was a healthier meat option than red meat (Putnam and Gerrior 1999). Now the trend is towards consuming local, grass-fed meat that is leaner and has a "more natural" diet (Conner, Campbell-Arvai, and Hamm 2008; Leheska et al. 2008; Daley et al. 2010). In addition to concern about the nutritional content of meat, consumers are concerned about where their food comes from (Daley et al. 2010; Friend 2008). Proponents of the locavore movement are seeking less "factory-farmed" foods, and a closer connection to

Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.

their food system. In Michael Pollan's (2006) acclaimed book, *The Omnivore's Dilemma*, he discusses hunting for his food as the culmination of his research. More recent books promoted game and fish as the ultimate meat source (Pellegrini 2011; Shaw 2011; Cerulli 2012).

Though local food proponents are demonstrating interest and preferences for wild fish and game, there remain ambiguities and uncertainties concerning the nutritional content of these foods. For some wild species, despite claims celebrating its healthful virtues, there is no way to know the nutritional content because they have not been analyzed, and are therefore not listed in the USDA National Nutrient Database for Standard Reference (USDA NND). For example, ruffed grouse (*Bonasa umbellus*) is often referred to as "road chicken," yet we cannot say if it is similar in nutrient content to domestic chicken because the nutrition facts are not part of the standard database. Brook trout (*Salvelinus fontinalis*), a native fish of eastern North America, belong to the "char" sub-group of salmonine fishes that is distinct from the "true" trout and salmon, but often has the same characteristic orange color of wild caught Alaskan salmon. It is not known if it has a similar nutritional profile to salmon or trout because the nutritional content analysis has not been conducted for that species. USDA NND has nutritional content listed for wild trout, mixed species, of which brook trout is just one component. Further, though recipes for woodchuck (*Marmota monax*) and snapping turtle (*Chelydra serpentina*) are found in the *Joy of Cooking* cookbook, their nutritional values are also unknown.

Given this lack of information, and our program team's (cf. <http://wildharvesttable.com/about-the-wild-harvest-table/>) desires to be able to respond to consumer questions regarding the nutritional qualities of wild fish and game, we set out to determine what species that have a legal,

Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.

regulated hunting and fishing seasons in New York State, according to the New York State Department of Environmental Conservation (NYS DEC) Hunting and Fishing Regulations (NYSDEC 2012a, 2012b) are listed in the USDA NND, and where information gaps occur.

## **Methods**

We reviewed the NYS Freshwater Fishing Regulations (NYS DEC 2012a), and the NYS Hunting and Trapping Regulations Guide (NYS DEC 2012b). All the fish and game species that had regulated hunting or fishing seasons were documented. These species were then cross-referenced with the USDA NND. We determined and recorded what wild game and fish species had nutrition data available, those species that did not, and what the closest domestic match might be (e.g., Canada goose is not listed in the USDA NND, but “goose, domesticated” is). We found that some species could be lumped into larger groupings. For example “yellow perch” as listed by NYS DEC, could be matched with “perch, mixed species” in the USDA NND, but we chose not to do that for this project. Similarly some species had domesticated versions listed in the USDA NND, such as “goose,” but not specifically “Canada goose”, so this species was not considered as represented in the nutrient database. Eel which is generally caught for bait, not human food, was not part of the dataset. The numerous species of wild ducks, such as mallard (*Anas platyrhynchos*), pintail (*Anas acuta*), canvasback (*Aythya valisineria*), black duck (*Anas rubripes*), and others, were all noted under the category “duck, mixed species”. Many of the non-native sport fish species that are stocked by the NYS DEC (e.g., brown trout [*Salmo trutta*], or Coho salmon [*Oncorhynchus kisutch*]) were not included in the data (Table 1).

Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.

Species Listed in NYS DEC Hunting & Fishing Regulations*:	Listed in USDA National Nutrient Database?	Closest Species Listed in Database
Beaver ( <i>Castor canadensis</i> )	Yes	
Black Bass, small or largemouth ( <i>Micropterus salmoides</i> )	Yes	mixed species of fresh water bass
Black bear ( <i>Ursus americanus</i> )	Yes	black bear (Alaska Native)
Brant ( <i>Branta bernicla</i> )	No	domesticated goose
Brook trout ( <i>Salvelinus fontinalis</i> )	No	trout, mixed species
Bullhead ( <i>Ameiurus nebulosus</i> )	No	catfish, channel, wild, raw
Coot ( <i>Fulica Americana</i> )	No	duck, wild
Crappie ( <i>Pomoxis nigromaculatus</i> )	No	N/A
Crow ( <i>Corvus brachyrhynchos</i> )	No	N/A
Duck, multiple species	Yes	duck, wild
Feral swine ( <i>Sus scrofa</i> )	No	Game meat, boar or pork
Frog ( <i>Rana catesbeiana</i> )	yes, legs only	not indicated if farmed or wild
Gallinule ( <i>Gallinula chloropus</i> )	No	N/A
Canada goose ( <i>Branta canadensis</i> )	No	domesticated goose
Lake trout ( <i>Salvelinus namaycush</i> )	No	trout, mixed species
Lake whitefish ( <i>Coregonus clupeaformis</i> )	Yes	whitefish, mixed species
Landlocked salmon ( <i>Salmo salar</i> )	No	Atlantic salmon
Merganser ( <i>Mergus merganser</i> )	No	duck, wild
Muskellunge ( <i>Esox masquinongy</i> )	No	N/A
Muskrat ( <i>Ondatra zibethicus</i> )	No	N/A
Northern pike ( <i>Esox Lucius</i> )	Yes	Fish, pike, northern
Opossum (colloquially possums)	Yes	Game meat, opossum
Pheasant ( <i>Phasianus colchicus</i> )	Yes	not indicated if farmed or wild
Pickrel ( <i>Esox niger</i> )	No	N/A
Porcupine ( <i>Erethizon dorsatum</i> )	No	N/A
Quail, Bobwhite ( <i>Colinus virginianus</i> )	Yes	not indicated if farmed or wild
Rabbit, cottontail and varying hare ( <i>Sylvilagus floridanus</i> ) ( <i>Lepus americanus</i> )	Yes	rabbit, wild
Raccoon ( <i>Procyon lotor</i> ),	Yes	Game meat, raccoon
Rail ( <i>Rallus</i> )	No	N/A
Ruffed grouse ( <i>Bonasa umbellus</i> )	No	N/A
Shad ( <i>Alosa sapidissima</i> )	Yes	shad, American
Snapping turtle (Chelydra serpentine)	No	green turtle (endangered & illegal to harvest)
Snipe ( <i>Gallinago gallinago</i> )	No	N/A
Snow goose ( <i>Chen caerulescens</i> )	No	domesticated goose
Squirrel; gray, black, fox and red ( <i>Sciurus carolinensis</i> )	Yes	game meat, squirrel
Sunfish: bluegill ( <i>Lepomis macrochirus</i> ), pumpkinseed ( <i>Lepomis gibbosus</i> ), redbreast ( <i>Lepomis auritus</i> )	Yes	sunfish, pumpkin seed

Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.

Walleye ( <i>Sander vitreus</i> )	Yes	Fish, pike, walleye
White-tailed deer ( <i>Odocoileus virginianus</i> )	No	game meat, deer
Wild turkey ( <i>Meleagris gallopavo</i> )	No	domesticated turkey, all classes
Woodchuck ( <i>Marmota monax</i> )	No	N/A
Woodcock ( <i>Scolopax minor</i> )	No	N/A
Yellow perch ( <i>Perca flavescens</i> )	No	perch, mixed species
<i>*furbearers that have a regulated hunting season, but are not typically consumed not included in this table; bobcat, coyote, fisher, fox, marten, mink, skunk, and weasel</i>		

## Results and Discussion

We found that only 38% of species (16 of 42) that are legal to hunt or fish in New York State are specifically listed in the USDA NND. Some of the species that have hunting seasons are furbearers and not typically considered meat for consumption, such as mink (*Neovison vison*) or coyote (*Canis latrans*) and these species were not included. Other furbearing species that were included in the data have fallen out of favor in the typical American diet, such as raccoon (*Procyon lotor*), yet are still consumed and gourmet recipes can be found to prepare them. Feral swine can consist of domesticated pigs gone wild, and/or wild boars (*Sus scrofa*, native to Eurasia) that have escaped shooting facilities (Stegemann 2012). It has not been determined if their nutritional content differs from domestic pork or boar meat. Because feral swine are considered an invasive, exotic species in New York State, and the management goal is to eradicate them, they are more likely to be consumed in greater numbers in the future. Furthermore, had all of the species that were combined into one (i.e., “ducks” rather than specifically mallard, black duck, pintail, etc.) been specifically included as individual species, the percentage of species with listed nutritional data would be even less than 38%.

For the game and fish species that are listed in the USDA NND there was a difference in nutritional content between the wild and farm-raised animals. The wild versions tended to have

Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.

less fat (nearly 50% less fat in many cases) and therefore fewer calories. The wild versions also tended to have higher mineral and protein content than the farm-raised animals (Table 2).

Based on 3 ounce portions:	Wild rabbit	Farmed rabbit	Wild rainbow trout	Farmed rainbow trout	Ground wild deer meat	Ground grass-fed beef	Ground beef 85% lean
<b>Nutrients:</b>							
Energy (kcal)	97	116	101	120	134	163	183
Protein (g)	18.53	17.05	17.41	16.95	18.52	16.52	15.8
Total fat(g)	1.97	4.72	2.94	5.25	6.06	10.83	12.75
Total saturated fat (g)	0.587	1.412	0.614	1.176	2.859	4.537	4.986
Total mono-unsaturated fat (g)	0.536	1.276	0.960	1.682	1.143	4.082	5.572
Total poly-unsaturated fat (g)	0.383	0.919	1.051	1.281	0.335	0.452	0.367
Cholesterol (mg)	69	48	50	50	68	53	58
<b>Minerals:</b>							
Ca (mg)	10	11	57	21	9	10	13
Fe (mg)	2.72	1.34	0.60	0.26	2.48	1.69	1.78
Mg (mg)	25	16	26	21	18	16	15
P (mg)	192	181	230	192	171	149	145
K (mg)	321	281	409	320	281	246	251
Na(mg)	43	35	26	43	64	58	56
Zn (mg)	n/a	1.34	0.92	0.38	3.57	3.87	3.81

Based on these findings, researchers from Cornell University determined 3 important species that were both missing from the USDA NND, and were often consumed by hunters or fishers. The

Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.

research team from Cornell worked with the USDA NND to create a protocol for collecting samples and preparing them for nutritional analysis at approved laboratories. The species chosen were brook trout (*Salvelinus fontinalis*) because it represents the official New York State fish, Canada goose (*Branta Canadensis*) because they are abundant and often consumed by hunters, and ruffed grouse (*Bonasa umbellus*) because they are highly-coveted species with no farm-raised equivalent. Once completed, the nutritional analysis for these 3 species will be added to the USDA NND. At the writing of this paper, the brook trout data analysis was completed.

### **Conclusion**

Wild caught game and fish has recently been overlooked in discussions of healthy, locally-sourced meat. Consumers often choose their meat based on taste and nutritional content (Wang et al. 2010; Borra 2006; Miller and Cassady 2012). Without legibility and legitimacy of nutritional content for wild game and fish, consumers will not be able to make informed decisions about nutritional benefits of those meat options. Preliminary findings show that there are nutritional differences between farm-raised and wild-caught meat of the same or related species. Additional nutritional analysis should be completed, and added to the USDA NND. Research should also be targeted to determine if consuming wild-caught game and fish is associated with healthier lifestyles.



Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.

## Acknowledgements

We would like to thank Dan Josephson from Cornell University for assisting in collecting brook trout samples, Andy Weik of The Ruffed Grouse Society for grouse samples, Eric Riegel and Steve Sandroni for assisting in collecting Canada goose samples, Joanne Holden at USDA NND Lab for technical assistance with specimen collection and nutrient analysis protocol, Seneca County Cornell Cooperative Extension for coordinating project-related activities, and Gordon Batcheller at NYS DEC for support and guidance for this project.

## Abbreviations

USDA NND- United States Department of Agriculture's National Nutrient Database for Standard Reference

NYS DEC- New York State Department of Environmental Conservation

## References

- Borra, S. 2006. Consumer perspectives on food labels. *The American Journal of Clinical Nutrition* 83(5).
- Cerulli, Tr. 2012. *The Mindful Carnivore; A Vegetarian's Hunt for Sustenance*: Pegasus Books.
- Conner, D. S., V. Campbell-Arvai, and M. W. Hamm. 2008. Consumer preferences for pasture-raised animal products: results from Michigan. *Journal of Food Distribution Research* 39(2):12-25.
- Daley, C. A., A. Abbott, P. S. Doyle, G. A. Nader, and S. Larson. 2010. A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef. *Nutrition Journal* 9: .
- Daniel, C. R., A. J. Cross, C. Koebnick, and R. Sinha. 2011. Trends in meat consumption in the USA. *Public Health Nutrition* 14(4):575-83.
- Friend, C. 2008. *The compassionate carnivore : or, how to keep animals happy, save Old MacDonald's Farm, reduce your hoofprint, and still eat meat*. Philadelphia, PA: Da Capo Lifelong.
- Leheska, J. M., L. D. Thompson, J. Boyce, J. C. Brooks, B. Shriver, L. Hoover, M. F. Miller, J. C. Howe, and E. Hentges. 2008. Effects of conventional and grass-feeding systems on the nutrient composition of beef. *Journal of Animal Science* 86(12):3575-3585.
- Miller, L., M. Soederberg, and D. L. Cassady. 2012. Making healthy food choices using nutrition facts panels. The roles of knowledge, motivation, dietary modifications goals, and age. *Appetite* 59(1):129-139.
- NYS DEC. 2012a. New York Freshwater Fishing: 2012-13 Official Regulations Guide. N. Y. S. Dept. of Environmental Conservation, Albany, NY.
- . 2012b. Hunting & Trapping Regulations Guide 2012-13 Official Guide to Laws & Regulations. N. Y. S. Dept. of Environmental Conservation, Albany, NY.

- Tidball, Moira M., Tidball, Keith G., & Curtis, Paul D. (in press). The Absence of Wild Game and Fish Species from the USDA National Nutrient Database for Standard Reference: Addressing Information Gaps in Wild Caught Foods. *Ecology of Food and Nutrition*.
- Pellegrini, G. 2011. *Girl Hunter*. first ed: Da Capo Press.
- Pollan, M. 2006. *The omnivore's dilemma : a natural history of four meals*. New York: Penguin Press.
- Putnam, J. 2000. Major trends in U.S. food supply, 1909-99. *Food Review* 23:8-15.
- Putnam, J., and S. Gerrior. 1999. Trends in the U.S. food supply, 1970-97. In *America's Eating Habits: Changes and Consequences* Agriculture Information Bulletin No. (AIB-750) edited by E. Frazao: USDA/ERS.
- Shaw, H. 2011. *Hunt, Gather, Cook*: Rodale.
- Stegemann, E. 2012. Pigs Gone wild- feral swine threaten New York State. *New York State Conservationist* (October-November) 2012: 22-25.
- Wang, Y., M. A. Beydoun, B. Caballero, T. L. Gary, and R. Lawrence. 2010. Trends and correlates in meat consumption patterns in the US adult population. *Public Health Nutrition* 13(9):1333-45.