Untrapped potential: Do bear hunter cameras accurately index nontarget species?

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Abstract
Remote camera use by hunters offers the potential to collect citizen-derived data on multiple species using hunter surveys, but the effectiveness of this approach is untested. We examine whether observations from remote cameras that hunters use at their black bear (*Ursus americanus*) bait sites and reported via hunter surveys are an effective method to monitor species. We compared data collected from pseudo-bear bait sites established for this study to hunter established bear bait site observations from the same study area. We also quantified observations reported on hunter surveys as a landscape index alternative to white-tailed deer (*Odocoileus virginianus*) hunter indices, gray wolf (*Canis lupus*) surveys, and mustelid (Mustelidae) trapper indices. We did not detect a difference in hunter-reported camera observations versus our observations for four of the six species recorded at pseudo-bear bait sites. Hunters were over nine times more likely to report photographing wolves and nearly one third as likely to report photographing mustelids. We observed a relationship between trapper survey-derived mustelid indices and the camera-derived index, but not for deer or wolves. Foremost, these results emphasize the need to further evaluate the utility of remote camera data derived from hunters. The widespread use of remote cameras by hunters, the low-cost of hunter surveys, and the potential to collect accurate community composition and occurrence/presence indices, points to the value of adding questions to hunter surveys regarding multiple species of interest.

KEYWORDS
baiting, black bear, camera trap, hunter survey, hunting, index, Upper Peninsula of Michigan, *Ursus americanus*

1 INTRODUCTION
Monitoring wildlife populations is essential to effective species conservation. As monitoring methods and technology improve, our understanding of animal distributions and resource use becomes more comprehensive. This is especially true for remote cameras, which have proven to be an effective tool for occupancy as well as
spatial, and temporal, patterns of multiple species (Candler, Severud, & Bump, 2019; O’Malley, Elbroch, Lendrum, & Quigley, 2018; Wang, Allen, & Wilmers, 2015). Remote cameras have also proven effective in characterizing species use of black bear (*Ursus americanus*) and white-tailed deer (*Odocoileus virginianus*) hunter bait sites (Bowman, Belant, Beyer, & Martel, 2015; Candler et al., 2019). Experimental or observational bait sites across management jurisdictions (i.e., hunting unit, a state) would provide the most control over potentially confounding variables (e.g., density of camera sites, distribution) when examining species at bait sites. The logistics and cost of such studies, however, can be restrictive or prohibitive to researchers.

Hunter surveys may offer a method to overcome these challenges (Crum, Fuller, Sutherland, Cooch, & Hurst, 2017; Mahard, Litvaitis, Tate, Reed, & Broman, 2016). In many states, hunters are surveyed yearly to assess hunter participation, success, and satisfaction (Duda et al., 2020; Frawley, 2019; Wyoming Game and Fish Department, 2021). Adding survey questions regarding nontarget species that hunters observe at their bait sites can help managers understand species presence at and use of bait sites at larger scales. As remote cameras have become more affordable, hunters have begun to use them to record animals that travel certain trails or frequent bait sites. Similar to their use in conservation research, hunters use cameras to identify individuals, understand local occurrence, and track the diel cycles of animals (Roland & Slauson, 2008).

To test the effectiveness of hunter surveys as an approach to estimate species’ presence at, and likely use of, hunter bait sites, we compared data from pseudo-bear bait sites in Michigan to responses from the annual Michigan Black Bear Hunter Survey. The survey included questions regarding remote camera use and the species that hunters recorded at their bait sites. We expected that

![Figure 1](image-url)  
**Figure 1** Pseudo-bear bait site locations. Locations of 21 black bear (*Ursus americanus*) pseudo-bear bait sites with remote cameras deployed August–October 2016 in the Western Upper Peninsula (UP) of Michigan. The study site was located in the Baraga hunting unit, which includes land east of US highway 45 and north of Michigan State Highway 28. The bottom map indicates bear management units in the UP.
the proportion of cameras at our pseudo-bear bait sites that recorded various species at bear bait sites would be equal to the proportion of hunter-reported observations of the same species at their bait sites for the same geographic areas.

We also assessed the effectiveness of camera observations reported on hunter surveys as an index for gray wolves (Canis lupus), white-tailed deer, and mustelid species, such as American marten (Martes americana) and Fisher (Pekania pennanti), at the landscape scale, that is, in different counties in Michigan’s Upper Peninsula (hereafter UP; Figure 1). Counties are the finest scale that hunting reports are recorded for all species and frequently the scale of wildlife management and conservation within states. We predicted that the proportion of hunter-reported observations of each species or family (camera index) in each county would be positively correlated to independent data from the Michigan Department of Natural Resources (MI DNR) on wolves (bi-annual surveys), white-tailed deer (harvest reports), and mustelids (trapper reports).

2 | STUDY AREA

We analyzed hunter survey and abundance data across the entire UP of Michigan, but conducted our camera trap observations in the western UP within the Baraga bear hunting unit encompassing our pseudo-bear bait sites (Figure 1). In 2016, bear hunters purchased 1,135 permits for the Baraga hunting unit and ~97% of hunters used bait to attract bears (Frawley, 2017b).

The UP (~44,123 km²) was primarily deciduous forest (33%), wetlands (32%), and evergreen forest (10%) (Homer et al., 2015). Elevation ranges from approximately 156–603 m. In 2016, 2017, and 2018, an estimated 96, 97, and 97% of bear hunters in the entire UP (4758, 4862, and 4725 permits sold, respectively) used bait (i.e., artificial food sources) to attract bears, respectively (Frawley, 2017b, 2018a, 2019d).

3 | METHODS

3.1 | Field observations

During August 1, 2016–October 26, 2016, we conducted camera trap surveys to determine nontarget species occurrence at bear hunter bait sites. We selected 21 sites within the Baraga hunting unit that matched characteristics used by bear hunters, such as proximity to water and tertiary roads. These sites were created at locations where nontarget species’ densities were similar among sites (e.g., gray wolf density; O’Neil, 2017). Sites were located on public lands open to hunting (i.e., National and State Forest and commercial forest lands; Figure 1). At each site, we deployed one camera (Reconyx Hyperfire series, Holmen, WI). We programmed each camera to take two consecutive pictures once triggered, with a 5 min delay between trigger events (Bowman et al., 2015; Candler et al., 2019).

After camera sites were established (August 1, 2016), we constructed bait sites at all 21 camera locations 2–3 m from each camera on August 10, 2016, the first day that legal baiting is allowed. We baited each site with a mixture of food that replicated a typical Michigan bear hunter’s bait (a combination of pie filling, pastries, meat products such as dog and cat food, imitation maple syrup, cafeteria leftovers, fryer grease, and Bruin Buster predator lure [James Valley Scents, Mellette, SD]). Bait content varied across baiting occasions but was consistent among sites for each baiting instance (Candler et al., 2019). We baited twice a week until August 26, 2016 when we switched to baiting once a week to mimic bear hunter behavior (Frawley, 2017b).

We subset photos that were recorded from the time baiting started (August 10, 2016) to the time most hunters harvest a bear and retrieve their cameras (September 24, 2016; Frawley, 2017b). This was the time period when hunters were most likely to record species at their bait sites. For each camera we determined if a photo recorded a bear, coyote (C. latrans), deer, bobcat (Lynx rufus), wolf, or mustelid during the 46-day period in order to directly compare species observed at pseudo-bear bait sites with data from questions in the hunter survey.

3.2 | Hunter survey

In 2016 the we worked with the MI DNR to add two questions to the Michigan Black Bear Hunter Survey asking hunters to indicate whether they used bait and a remote camera and, if so, what species were recorded (bear, coyote, deer, bobcat, wolf, or marten and/or fisher) at their bait sites (marten and fisher were later combined into a “mustelid” group for analysis; Appendix). The MI DNR provided bear hunters the option to report using an online survey. In addition to voluntary respondents, a random sample of hunters who purchased a bear harvest license were mailed the same survey (Frawley, 2017b).

4 | DATA ANALYSIS

4.1 | Observational comparison

To compare the survey data to the field observations, we subset statewide survey data to include only responses
from hunters who baited, used a remote camera, and hunted in the Baraga bear management unit (BMU) in the western UP in the area that overlapped with our study site. We eliminated observations from hunters who hunted only in Keweenaw County as we did not have camera traps north of Portage Canal. We restricted our sample to observations reported from a single county to ensure observations were correctly assigned geographically since some hunters reported hunting in two or three counties, but observations were not assigned to each county in such cases.

We calculated proportions of each species at pseudo-bear bait sites and hunter-reported observations to evaluate frequency of occurrence differences between the two groups. We compared the difference in proportions between the number of observational cameras that recorded a species at least once and the number of hunters that reported species using Fisher's exact test ($\alpha = .05$) (Ramsey & Schafer, 2002). This test indicates the odds that a given species will be recorded by cameras at hunter versus pseudo-bear bait sites, a 1 indicating that the odds, for either method, are equal. The confidence interval produced is asymmetrical since the distribution of the odds ratio is from 0 to infinity. This simple, yet robust, comparison is an effective test (Zar, 1999) between the proportions of species reported by hunters and those recorded at pseudo-bear bait sites.

### 4.2 Camera index analysis

To compare the MI DNR reports (i.e., deer hunter and mustelid trapping reports) and wolf survey results to hunter observations recorded in the black bear hunter survey, we also restricted our sample to observations from hunters that hunted in a single county. We included observations from each of the 15 Michigan UP counties to compare them to wolf survey data and deer and mustelid harvest densities. We determined the yearly density of wolves as well as harvest indices for deer and mustelids in each UP county using data provided by the 2016 and 2018 MI DNR wolf survey results, the 2016–2018 Michigan Deer Harvest Survey Reports, and the 2016–2018 Michigan Furbearer Harvest Surveys, respectively (Frawley, 2017a, 2018a, 2019d). We used counties as our unit of comparison because it is the smallest common unit between the black bear hunter, deer hunter, and mustelid trapping surveys, and it also matches the scale of wildlife management for many states. We calculated harvest indices for mustelids and deer for each county by dividing the total number of mustelids trapped or deer harvested in each county by the total area of the county. We removed Isle Royale National Park from the area of Keweenaw County because no hunting or trapping occurred on the island. Wolf survey units (WSU) do not directly correspond to county boundaries (i.e., some counties are entirely within a single WSU and some counties cross WSU boundaries). We were interested in how hunter camera trap data might reflect landscape-level wolf occurrence, so we derived county-level wolf densities based upon a weighted average of WSU values and area within each county. While mustelid and deer harvest reports covered the entire UP annually, only 40% of WSUs were surveyed in both 2016 and 2018 which resulted in gaps in the UP where wolves were not surveyed. For counties that did not have full coverage, we applied the index estimates for the surveyed areas to the entire county. Because wolf populations in the UP appear to be stable, estimating county density from WSUs is robust despite minimal survey effort in some counties (O’Neil, 2017).

We calculated a camera index for each county by dividing the number of hunters who baited and reported the detection of a given species by the total number of hunters who baited and used a camera within each respective county (Appendix). We examined the relationship between camera index and county-level wolf density estimates, white-tailed deer harvest indices, and mustelid harvest indices using Pearson’s correlation coefficients ($\alpha = .05$). We also fit simple linear regression models to the data to examine the relationship between harvest indices among counties and the camera index. We accounted for human presence at hunter bait sites in all models by incorporating bear hunter effort days as an additional explanatory variable. This variable was derived from the Michigan Black Bear Hunter Surveys (Frawley, 2017b, 2018a, 2019d).

### 5 RESULTS

#### 5.1 Observational comparison

Of the total number of hunters who baited in the observational study area, 69% of them used remote cameras. After subsetting survey data to include bear hunters who used a remote camera while hunting exclusively within the boundaries of our study area in the Baraga BMU, we analyzed 221 of 474 hunter reports. Our observational cameras at pseudo-bear bait sites recorded the same species as those reported by hunters (Table 1). The likelihood of hunters reporting that they observed wolves was 9.41 (95% CI: 1.44–397.14) times greater than at our pseudo-bear bait sites. Hunters were less likely to observe mustelids (0.31 95% CI: 0.09–0.88; Table 1). We did not detect a difference between any other species recorded by either method (Table 1).
5.2 Camera index analysis

In the UP overall, 76% of 3,100 surveyed hunters in 2016, 76% of 3,181 surveyed hunters in 2017, and 80% of 3,238 surveyed hunters in 2018 that used bait also used remote cameras. The camera index across counties was positively, but weakly, correlated to the harvest density indices of mustelids (Pearson’s $R = 0.415$, $p = .005$) and deer (Pearson’s $R = 0.329$, $p = .027$) in each county, but was not correlated for wolves (Pearson’s $R = 0.077$, $p = .687$). A relationship between camera index and independent MI DNR indices was significant for mustelids ($R^2 = 0.267$, $p = .002$) when including bear hunter effort as an explanatory variable (Figure 2). We did not, however, detect a relationship between camera index and wolf ($R^2 = 0.061$, $p = .430$) or deer ($R^2 = 0.124$, $p = .063$) indices across UP counties (Figure 2).

6 DISCUSSION

While some states (e.g., Iowa, Wisconsin, and Minnesota) use hunter observations to monitor trends in wildlife populations, these methods can be biased by hunter presence and be incomplete because they only incorporate the time that a hunter is making observations (i.e., daylight hours; Lohr, 2017; Harms, Coffey, & Evelsizer, 2018; Obermoller, Norton, & Cornicelli, 2018). Other studies have used hunter surveys to glean information about non-target species observed by hunters as well (e.g., Caruso, Luengos Vidal, Guerisoli, & Lucherini, 2017; Crum et al., 2017; Mahard et al., 2016), but to our knowledge, this is the first comparison of hunter reports to a field study using the same method (i.e., remote cameras deployed at bait sites). Overall, this study highlights the potential effectiveness, as well as some of the opportunities and
limitations of using hunter remote camera photographs as a surrogate or additional method for camera trap-based monitoring and field studies for multiple species. In particular, data from surveys of hunters who use cameras are potentially useful in species distribution and occupancy modeling (e.g., presence only approaches), but not widely applicable to assessing population trends depending on the species.

As predicted, the observational comparison produced statistically similar results, for four of six species at the county scale. The two methods differed in the proportion of sites that recorded wolves and mustelids at bait sites, with hunters detecting wolves in more of their photos and mustelids in fewer than we did at our pseudo-bear bait sites. Because we could not confirm correct identification of species by hunters, there may be some misidentification between similar-looking species such as wolves and coyotes. Additionally, people often overreport species that they perceive to cause more human-wildlife conflict, which may be wolves in this case (Bump, Murawski, Kartano, Beyer Jr, & Roell, 2013; Caruso et al., 2017; Ruid et al., 2009). In the Great Lakes states, hunters have a low tolerance for wolves as they consider them a threat to hunting and safety (Hogberg, Treves, Shaw, & Naughton-Treves, 2016; Vucetich, Bruskotter, Nelson, Peterson, & Bump, 2017). In addition, unlike the bordering state of Wisconsin, Michigan does not compensate for bear dogs that may have been killed by wolves (Bump et al., 2013). This lack of compensation may lead to additional distain for wolves by bear hunters (Treves, Jurewicz, Naughton-Treves, & Wilcove, 2009). This underlying intolerance may affect a hunter’s decision or inclination to identify a canid as a wolf if they are uncertain of its identity (Caruso et al., 2017). For example, if only 16 of 221 hunters misidentified coyotes as wolves, which is easily plausible, the proportions would not be significantly different between hunter reported observations and our pseudo-bear bait sites observations in our analysis. This may also partially explain the lack of correlation between the camera index and wolf density across the UP.

In addition to misidentification, human presence and time spent at bait may affect the species that are recorded by hunters versus ones recorded at the pseudo-bear bait sites. We only visited experimental sites for the purpose of baiting, while hunters visited bait sites for baiting and hunting. The increased presence of humans at the bait site may have deterred mustelids from visiting the bait (Powell, 1993) and explain the difference in mustelid observations between the two methods. If increased presence of humans deterred mustelids, then the pseudo-bear bait sites may have overestimated true visitation.

The comparison between hunter survey data (camera index) and other indices is additional evidence for the utility and untapped potential of hunter surveys in non-target species monitoring; it is worth exploring this approach further. As we expected, the mustelid harvest index was positively correlated with the hunter-derived camera index across the UP. Though hunters reported photographing fewer mustelids than expected in the previous analysis, the trend demonstrated in the correlation between camera index and harvest index is valuable as relative change over time is often of interest in wildlife management and conservation. Additionally, underreporting of mustelids by hunters provides a conservative index estimate that can alert managers to reduced numbers before a real problem arises. Differentiating between fisher and marten in the analysis would also be more informative to managers. Our assessment could be improved to better account for variation in species density across counties (Figure 2). In the future, camera index predictions may be improved by including habitat variables such as cover type and by gathering camera effort data (i.e., the number of days a camera is deployed), and number of cameras used per hunter from the hunter survey. These would likely be an important descriptive variable in modeling species indices, would be more appropriate than simply hunter effort as estimators of human presence at bait sites, and could be easily added to hunter surveys. With advancements in online surveys, hunters could also upload images that could be used to create detection histories. Such additions would also allow managers to possibly develop occupancy models to detect changes in occupancy and possibly estimate abundance (e.g., integrated population models), particularly at bait sites that are consistently baited every year. This is a technique that is not possible with data that is currently available (Ahrestani, Hebblewhite, & Post, 2013; Royle & Nichols, 2003; Zipkin & Saunders, 2018).

Contrary to our expectations, we did not find a significant correlation between wolf density and camera index. This may be due to misidentification of wolves, as suggested above, but may also be a result of the gaps in wolf density estimates and the method we used to estimate density. Only 2 years of data are presented here, so it would be inappropriate to make assumptions about trends. As more data are collected across years, more detailed analysis could compare camera index to counties that have more complete wolf surveys.

Although some of the variation in the white-tailed deer index was captured by camera index it varied greatly among years (including year as an interaction variable would be inappropriate as there are too few samples per year in the current data set). This high variability may be reflective of the behavior of deer around bear hunter bait. At our pseudo-bear bait sites for instance, we observed...
deer, but they were often passing through the area and may not have been attracted to bear bait like mustelids (Holinda, Burgar, & Burton, 2020; Ribeiro & Bianchi, 2020). Additionally, the deer index derived from hunter harvest data was dominated by a single sex (males) while cameras captured either sex. Adding an additional question to the hunter survey asking for number of antlered and antlerless deer recorded would make this comparison more appropriate. To gain a better understanding of deer activity or abundance using information derived from hunter cameras, it may be more beneficial to use camera index information from deer hunter survey results instead of bear hunter survey results. The MI DNR has recognized the potential in collecting these data and has since added similar questions to the Michigan Deer Harvest Survey Report (Frawley, 2019c; Frawley, 2020).

While caution should be used when developing indices, they show potential to be useful in identifying population and landscape level responses to management decisions or environmental changes (Cooper, Nielsen, & McDonald, 2012; Letnic et al., 2011; Mahard et al., 2016). With improvement to the camera index models (e.g., inclusion of habitat and camera effort as well as additional years of collection to better understand annual variation) the hunter-derived camera index could be an additional tool for the DNR to detect variation in some species’ trends at the county level. As hunters become accustomed to camera-trap related questions and surveys increasingly become electronic (e.g., web and app based), additional details may be collected such as images of species per unit time (e.g., day, week, etc.) and identification of individuals for use in mark-recapture methods as is performed with some species (Alonso, McClintock, Lyren, Boydston, & Crooks, 2015; Jhala, Qureshi, & Gopal, 2011; Moore, Champney, Dunlop, Valentine, & Nimmo, 2020). For example, deer identified via antler formation and ear notches, American martens identified from their ventral patches, and other species identified using tags from other studies (e.g., collared wolves) can be used in mark-recapture analyses (Jordan, Barrett, & Purcell, 2011; Macaulay, Sollmann, & Barrett, 2020; Sirén, Pekins, Abdu, & Ducey, 2016). Collection of such metrics would expand the utility of camera data from presence, composition, and range metrics to more robust relative abundance measures. Additionally, camera-trap derived indices may have the potential to fill in gaps between years that more rigorous field work is conducted or between survey years (O’Brien, Baillie, Krueger, & Cuke, 2010). This approach may be most useful to detect changes in species’ relative occurrence, range, or density if the species is intensely surveyed infrequently or not at all (O’Brien et al., 2010).

Though our analysis shows potential for using hunter-supplied information, it is not recommended as a stand-alone tool. Outside factors are likely to affect the interpretation of species distributions and relative densities from year to year. For example, in food-poor years, some species may use bait or move more often and be recorded at a higher rate than in good-food years (McCall et al., 2013; Oro, Genovart, Tavecchia, Fowler, & Martinez-Abrain, 2013). This may inaccurately indicate an increase in relative density for some species. Additionally, if bait type or quantity regulations change within the area of observation, species visitation to bait are also likely to change. Wildlife managers should consider additional metrics, such as food availability and bait regulation changes, when interpreting hunter reports at bait sites.

Hunter harvest numbers have long been used as a proxy for species population trends and relative densities (Brand & Keith, 1979; Rolandsen, Solberg, Herfindal, Moorter, & Sæther, 2011). These hunter proxies, derived from hunter reports, are often biased by hunting regulations and hunter preference. With the advancement and adoption of remote camera technology by hunters, additional information is incidentally being collected. Other studies have employed hunter citizen scientists to record observation or sign of a single species encountered while hunting (Cooper et al., 2012; Crum et al., 2017; Mahard et al., 2016). Our analysis shows that adding questions related to remote cameras to hunter surveys is likely an effective and relatively inexpensive way to collect information on numerous, but not all, species across a large scale. Additionally, the reported hunter observations are likely more representative than harvest indices as remote camera images are not restricted by harvest regulations (e.g., age or sex restrictions) or harvest’s preference (e.g., antler-point restrictions imposed on deer). Information from hunter reports can be used to identify non-target species using bait sites, which has the potential to serve as an index of relative occurrence of species in different management areas. The MI DNR has recognized the utility of including these questions on surveys and expanded their use beyond black bear hunter survey to now include the whitetailed deer hunter survey. Additionally, hunter surveys may act as a monitoring tool for rare or recovering species (e.g., lynx or cougar) that hunters might observe on their remote cameras. Additional research on the relationship between the abundance of hunter-captured presence data and estimates of species occupancy, density, and abundance, particularly with capture-mark-recapture methods, is warranted, which highlights the utility of adding remote camera related questions to hunter surveys.

7 | IMPLICATIONS

Hunter surveys offer an effective, wide reaching, and relatively inexpensive way to collect data about hunter
activity and species trends. Additionally, hunters are increasingly using remote cameras to monitor their hunting sites and inevitably record numerous wildlife species. This immense volume of camera data to monitor wildlife is a resource that has yet to be accessed to its full potential. We suggest that managers consider including questions regarding remote camera use and nontarget species, particularly species that require high-cost resources to monitor, on hunter surveys. Though the indices reported in this analysis require additional exploration to improve their utility, the inexpensive nature of adding these questions to hunter surveys as well as the popularity of remote cameras with hunters makes adding these questions a management opportunity to examine. Adding these questions now will ensure a larger pool of data to incorporate once indices are refined.

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CONFLICT OF INTEREST
The authors declare no potential conflict of interest.

AUTHOR CONTRIBUTIONS
Ellen Candler: Conceptualization; project development; data collection and analysis; writing. William Severud: Model development; editing and review. Dean Beyer Jr: Conceptualization; survey question development; editing and review. Brian Frawley: Survey development and analysis; editing and review. Joseph Bump: Conceptualization; model development; writing; editing and review.

DATA AVAILABILITY STATEMENT
Survey data may contain personal identifying information from hunters. A data request can be submitted to the Michigan Department of Natural Resources.

ETHICS STATEMENT
Michigan hunter survey information was collected under the authority of Part 435, 1994 PA 451, M.C.L 324.43539.

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APPENDIX A: 2016 MICHIGAN BLACK BEAR HUNTER SURVEY

It is important that you complete and return this report even if you did not hunt or harvest a bear. If you want to provide your answers via the internet, visit our website at michigan.gov/bear.

1. Did you hunt bear in Michigan during the 2016 season?
   - [ ] Yes
   - [ ] No; (if you select “No”, you are finished. Please return the survey.)

2. Please report the number of days for each county that you hunted bear in the following table.

| COUNTY HUNTED (List each county that you hunted for bear; for example, Marquette County) | NUMBER OF DAYS HUNTED | TYPE OF LAND |
|----------------------------------------|-----------------------|--------------|
|                                        | 1 Private             | 1 Both       |
|                                        | 2 Public              |              |
|                                        | 3 Both                |              |

3. Did you hunt with a firearm, crossbow, or bow during the 2016 bear season? (select all that apply)
   - [ ] Firearm
   - [ ] Crossbow
   - [ ] Bow (recurve, compound, or long bow)

4. What hunting method did you use most often when hunting bear in Michigan during the 2016 bear season? (Please select only one item.)
   - [ ] Hunted over bait only
   - [ ] Used dogs only (bait not used)
   - [ ] Used other methods not involving dogs or bait

5. If you used bait to attract bears, what was the total number of gallons you used during the legal baiting and hunting periods?
   Please write in gallons used.

6. If you used bait, select the types of bait you used. (select all that apply)
   - [ ] Chocolate or cocoa derivatives
   - [ ] Fruit or vegetables
   - [ ] Corn, grains, or granola
   - [ ] Bakery products including jams, jellies, or sweeteners
   - [ ] Meat and meat products, including dog food or grease
   - [ ] Fish and products, including cat food

7. If you used bait, did you use a trail camera to record events at a bait station?
   - [ ] Yes
   - [ ] No (if no, please skip to question 9.)

8. If you used a trail camera, what animals did you photograph? (select all that apply)
   - [ ] None
   - [ ] Bear
   - [ ] Coyote
   - [ ] Deer
   - [ ] Bobcat
   - [ ] Wolf
   - [ ] Marten
   - [ ] Fisher
   - [ ] Other: __________________________

Please continue on back
9. At any time during the 2016 season, did you hire a guide's service to hunt bear in Michigan?
   1. Yes  2. No (If no, please skip to question 11.)

10. If yes, what hunting techniques were used most often by the guide? (Please select only one item.)
   1. Hunted over bait only  2. Used dogs only (bait not used)
   3. Used dogs started over bait  4. Used other methods not involving dogs or bait

11. Did you kill a bear and place your harvest tag on it?
   1. Yes  2. No (If no, please skip to question 13.)

12. If your harvest tag was put on a bear, please fill in the information below
   a. What date was the bear harvested?
      (please check [x] the box for the date of harvest)

      | September 2016 | October 2016 |
      | S | M | T | W | T | F | S | S | M | T | W | T | F | S |
      | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
      | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
      | 25 | 26 | 27 | 28 | 29 | 30 | 30 | 23 | 24 | 25 | 26 |

   b. What was the sex of the bear?
      1. Male  2. Female  3. Not sure

   c. In what county was it harvested? __________ please write in county name __________

   d. On what type of land was the bear harvested?
      1. Private  2. Public

   e. What weapon was used to harvest bear?
      1. Firearm  2. Crossbow  3. Bow (recurve, compound, or long bow)

   f. What was the method of harvest?
      1. Taken over bait  2. Used dogs only (bait not used)
      3. Used dogs started over bait  4. Used other methods not involving dogs or bait

   g. If you used a hunting guide, was your hunting guide responsible for your success in taking a bear? (You can skip this question if you did not use a hunting guide.)
      1. Yes  2. No  3. Not sure

13. Did other hunters interfere with your bear hunting?
   1. Yes  2. No (Skip to question 15.)

14. If you answered “yes” to the previous question, was the interference caused by other bear hunters?
   1. Yes  2. No

15. How would you rate the following for your 2016 bear hunting season:
    (Select one choice per item.)

    a. Number of bear you saw.
       1. Very Good  2. Good  3. Neutral  4. Poor  5. Very Poor  6. Not Applicable

    b. Number of opportunities you had to take a bear.
       1. Very Good  2. Good  3. Neutral  4. Poor  5. Very Poor  6. Not Applicable

    c. Your overall bear hunting experience.
       1. Very Good  2. Good  3. Neutral  4. Poor  5. Very Poor  6. Not Applicable

Return the completed report in the enclosed postage-paid envelope. Thanks for your help.