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The acts of planning for and gestating human babies are increasingly using the tools and techniques that biologists use for wildlife surveillance and study. Or is it the other way around?  As a field biologist and a mother, I find myself wondering how much data is enough, and whether the disproportionate surveillance of pregnant bodies is worth the benefits of all that data.

**Biologging: a means for studying wildlife**

Biologging is a movement in the field sciences which posits that rigorous study of wildlife requires rigorous and intensive observation in the form of mostly the same kinds of data: food consumption, rest patterns, behavior, and physiology.  It most often requires that human researchers affix tracking devices to animals and surveil them passively from afar. Biologging has been made possible by the steep reduction in the cost of surveillance technologies and the rising ubiquity of internet and satellite networks to broadcast animal tracking output to and through.

Biologging approaches have been most quickly adopted for animals that are difficult or dangerous to track.  A subset of these technologies specifically aims to study pregnant wildlife, wildlife giving birth, and newborn wildlife: all stages of life where surveillance could be dangerous for the animal and/or the researcher. Wildlife that are pregnant or mothers will be more defensive if they see biologists following them, and in the biologging framework, this will not elicit ‘natural’ behavior worth studying and quantifying; it won’t reveal the truth about the animals.

For example, until very recently, female snakes were not believed to care for their young. This was not for lack of evidence; despite observations of rattlesnakes in family units for over a century, prominent snake biologists like Laurence Klauber dismissed the observations as coincidence. [After a group of prominent snake biologists led by Harry Greene published a chapter on maternal care in vipers in the 2002 book *Biology of Vipers*](http://eaglemountainpublishing.s3.amazonaws.com/PDF/Biology%20of%20the%20Vipers/CH%2012_greene_.pdf), more wildlife biologists began conducting and publishing studies on the topic. The emergence of smaller and cheaper radio transmitters in the 1980s made it possible to use them for tracking female snakes, especially pregnant ones. The resulting data provided quantifiable movement and location information that was not as easily refuted by the research community as simple qualitative observation. In the case of snakes, surveillance technology has been key to changing prevailing ideas about sex and reproduction. Snake researchers, mostly men, argued they were defending snake biology against anthropomorphism. But it looks more like they were refusing to acknowledge or consider attributes in snakes that they associated with female humans.

Arguably studying new rattlesnake mothers and their newborn young yielded great benefits by upending decades of misunderstanding about their behavior.  But not all examples of biologging impart small risks to pregnant and mother wildlife. Consider the stars of the 1942 Disney movie, *Bambi,* centered on a mother deer and her offspring. Wildlife biologists at the time did not know where fawns like Bambi were born or what their early life was like. To find out, wildlife biologists have since then adapted and adopted technologies explicitly for surveillance of pregnant white-tailed deer.

**Reproductive devices as a means of surveillance**

Vaginal implant transmitters (VIT) were developed specifically as a means of tracking pregnant deer and finding out when and where they gave birth. The design was adapted from hormonal implants used in livestock for the purpose of increasing fertility. VITs don’t contain any hormones; they house a temperature sensor that emits radio signals at set intervals. If the temperature drops, the radio signal changes. They are often paired with GPS collars to pinpoint the exact time and location of birth. The device is expelled when the fawn is pushed out and it sends the researchers an “expulsion email.”

[Wildlife contraceptive technology has been led by men experimenting on female non-human bodies for centuries](https://www.ncbi.nlm.nih.gov/pubmed/12268230), and VITs are no exception. VITs were first tested on deer in 1982, in a study led by Robert A. Garrott and Richard M. Bartmann on mule deer in northwest Colorado. Of the 10 pregnant deer they experimented on, two suffered severe vulvar trauma from the procedure and another three died from severe diarrhea. None of the fawns were recovered.   A [follow up study in 1994 led by Jacob L. Bowman and Harry A. Jacobson](https://www.jstor.org/stable/3784052) using 16 white tailed deer attempted to solve the vulvar trauma had better success. Subsequent studies refined the placement, housing, and success rate of locating VITs.

Despite adjustments made to reduce acute harm to deer during and after placement, the VITs’ purpose does not benefit individual female deer. Implanted female deer are valued by researchers only for the data they will provide to researchers, and they invest significant time, energy, and resources into transforming pregnant female deer into data loggers:

*“The value of these deer increases exponentially when the reversal drug is administered and they are released. They are sporting thousands of dollars in equipment. But that’s not the real value. Add up the days it took to capture her, the hours to check on her collar after she is tagged, the data being collected, the potential capture of 1 or both of her fawns, which in turn will be tagged and collared – she is in fact invaluable to the research project. For without her, there would be no research project. So I guess that justifies (kind of) the means to an end…but I doubt this unwilling patient would agree.”* -- Jeannine Fleegle, [Pennsylvania Game Commission biologist in the Deer and Elk Section](http://ecosystems.psu.edu/research/projects/deer/news/2016/deer-ob-gyn)

Using thermometers to track fertility is not new nor unique to deer. [Deanna Day](https://deannaday.net/) has written on women’s labor using thermometers for fertility tracking.  Women can track their basal temperature, which is linked to ovulation cycle phases, by precise and daily measurements.  Her reflections on this tracking within the quantified self-movement has parallels with modern wildlife biology. While all natural history is predicated on some surveillance of organisms, the recent ability to more cheaply and easily track wildlife and all kinds of attributes means surveillance is prolific and the default now. For women’s fertility tracking, cheaper technology has enabled the proliferation of smartphone apps to record and analyze the readings. But apps and smartphones have not perfected fertility tracking. The range of temperature change and specific dates is very individualized and requires interpretation. A 2016 study by researchers at the Medical College of New York found that [less than 10% of pregnancy tracking apps could give an accurate prediction of the best time to become pregnan](https://www.ncbi.nlm.nih.gov/pubmed/27275788)t.

And just as women negotiate chart temperature readings with their own lived bodily experience, similar troubleshooting and reflection is required with VITs, as deer bodies may not perform as expected by researchers. For example, in the original 1982 study, researchers found the frequency of the VIT readings didn’t match the phenomena they were trying to track, so the first recordings didn’t produce results and required refining based on expert natural history. Yet even after decades of tweaking, the process of placing VITs has not changed much; pregnant deer are tracked, shot with a sedative dart, and the VIT is placed using a PVC pipe as a plunger-applicator.

**How human biases shape the way we study wildlife**

[Molly Wiant Cummins’ work](http://opensiuc.lib.siu.edu/kaleidoscope/vol13/iss1/4/) on reproductive surveillance and docility in pregnant women speaks to this special valuation and surveillance of pregnant and implanted deer. Implanted pregnant deer become social, representational bodies; scientists require their passive participation. Failure to cooperate as a passive study organism can mean distress and death; a ‘good’ pregnant deer must cooperative in their surveillance.  This forced docility is counterintuitive in deer: undertaking a risky procedure with no benefit to the individual itself and contributing to a broader goal of optimizing reduced deer populations. Surveillance and discipline is thus necessary to maintain what Wiant Cummins calls “body-as-product,” where the pregnant female body is more valuable for the progeny inside her than as a self.  Female deer implanted with VITs are a means to an end; they become data loggers with the sole purpose of helping researchers find fawns. They are not seen as individuals themselves worthy of study and care.

Intensified and quantified surveillance was supposed to bring objectivity to wildlife biology, but

it is enacted through existing cultural biases about reproduction, motherhood, and gender.  Similarly, it’s worth asking how those biases impact what pregnancy tracking tools are supposed to give mothers and their families. Fertility tracking apps and other surveillance tools are supposed to empower women by putting data collection and interpretation in their own hands. Yet most often these technologies are now part of the Internet of Things and are storing and selling that same data to unknown parties; [a 2017 investigation of 20 common fertility and pregnancy tracking apps by the Electronic Frontier Foundation found extensive privacy and security concerns](https://www.eff.org/files/2017/07/27/the_pregnancy_panopticon.pdf). Pregnant women and mothers, just like deer, become valued as data products and collectors, not whole individuals.  Ultimately, how biologists study pregnant non-human bodies reflects how technologists view human mothers and pregnancy.