J Quant Criminol (2018) 34:37–66
https://doi.org/10.1007/s10940-016-9322-9

ORIGINAL PAPER

Court Sentencing Patterns for Environmental Crimes: Is There a "Green" Gap in Punishment?

Joshua C. Cochran[1] · Michael J. Lynch[2] · Elisa L. Toman[3] · Ryan T. Shields[4]

Published online: 15 September 2016

Abstract
Objectives This study examines sentencing patterns for environmental crimes and tests the assumption that "green" offenders receive more lenient treatment from criminal courts than non-environmental offenders.
Methods We present two sets of analyses. First, we present an empirical portrait of environmental felony offenses convicted in a single state (Florida) over a fifteen-year period and the resulting criminal sanctions. Second, we use a precision matching analysis to assess whether environmental offenders receive more lenient treatment when compared to non-environmental offenders with the same characteristics and offense severity scores.
Results Findings indicate that an overall small percentage of felony convictions in state courts stem from environmental crimes. We also find that punishments for environmental crimes are more lenient than sanctions assigned to comparable non-environmental offenses when the environmental crime is ecological, but that punishments are sometimes harsher when the environmental crime involves animals.
Conclusions The findings provide general support for the argument that courts and other formal institutions of social control treat environmental crimes more leniently than non-environmental crimes. This paper also raises important questions about citizen and state actors' perceptions of crimes against the environment and, more generally, about the ways

✉ Joshua C. Cochran
joshua.cochran@uc.edu

Elisa L. Toman
lucaelisa@mail.usf.edu

Ryan T. Shields
rshields@jhu.edu

[1] School of Criminal Justice, University of Cincinnati, Cincinnati, OH, USA

[2] Department of Criminology, University of South Florida, Tampa, FL, USA

[3] Department of Criminology, University of South Florida, Tampa, FL, USA

[4] Department of Mental Health, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD, USA

in which theories of court sentencing behaviors apply to environmental crime sanctioning decisions.

Keywords Sentencing · Environmental crime · Green criminology · Precision matching

Introduction

Scholarly attention to criminal sentencing practices has increased substantially over the past 40 years as get-tough punishment policies and mass incarceration intensified. Researchers have utilized state sentencing data to address a range of questions related to this toughening of punishment, including how sanctions vary across offender groups, the impacts of sentencing on recidivism, and the pathways that lead to disparities in sanction severity (e.g., Doerner and Demuth 2014; Johnson and DiPietro 2012; Kutateladze et al. 2014; Light 2014). Taken together, this body of scholarship has advanced sentencing theory to better understand the social context of punishment and inform policy debates related to criminal sentencing.

Despite these advancements, scholars have paid limited attention to environmental or "green" crimes and the punishment responses they elicit. There is, for example, little systematic knowledge about the types of punishments environmental offenders receive (Almer and Goeschl 2010; Billiet et al. 2014; Billiet and Rousseau 2014; Crow et al. 2013; Walters and Westerhuis 2013). It is similarly unclear how punishments for environmental offenders compare to punishments given to non-environmental offenders. Despite this lack of knowledge about sanctioning outcomes for environmental offenders, a growing body of scholarship on environmental crime has implied that environmental offenses are treated leniently by criminal courts, especially relative to the substantial harms incurred by environmental crimes (Simon 2000; Lynch and Stretesky 2003; O'Hear 2004). There is, however, a lack of empirical research that directly addresses this assumption (Cohen 1992).

The lack of attention to environmental crimes in sentencing scholarship is anomalous considering the substantial costs and harms that result from environmental crime. A limited but growing body of research has, for example, drawn significant attention to environmental crime and its deleterious impacts (e.g., Beirne and South 2013; Brisman 2008; Lynch and Stretesky 2003; South 1998; White 2013). The relative dearth of research in this area, paired with the substantial harms these crimes incur, underscores the need for rigorous empirical analyses of environmental crimes and their attendant punishments. Such assessments are also important because they can shed light on how formal social control systems respond to environmental offending—a critical step for informing future examinations of environmental crime and related policy. Not least, close examinations of sentencing decisions for environmental offenders can test the common but relatively untested belief that the courts will treat environmental crimes more leniently than comparable, non-environmental crimes (e.g., O'Hear 2004).

Against this backdrop, the present study seeks to advance theory and research on criminal sentencing practices and environmental crime. Towards this goal, the analysis has two parts. First, we provide a systematic examination of all environmental felony convictions for an entire state (Florida) over a fifteen-year period to assess the specific types of non-corporate, environmental criminal cases that courts process and their associated punishments. Second, we utilize a precision matching approach to compare sanction

outcomes and test the assumption that environmental offenders are treated more leniently than non-environmental offenders.

The paper proceeds in the following order. We begin with a brief discussion of the limited body of existing prior research on criminal sentencing related to environmental crimes. The paper then turns to a discussion of theoretical arguments about formal social control responses to environmental crimes and the assumption that environmental crimes will receive lenient treatment from state courts. Although this paper does not provide a direct test of prior sentencing theory, we draw on theory and research on court sentencing decisions commonly used in the sentencing literature to inform the paper's hypotheses and analyses. Next, we discuss the analytic strategy of the paper, which employs a matching methodology to account for potential confounding and to identify non-environmental offenders that are most comparable to environmental offenders, followed by discussions of the data, findings, and the various implications of the paper for future theory, research, and policy.

Background

Environmental Crime Sentencing Research

Scholarly interest in court sentencing practices emerged in the mid-1970s with the publication of several studies focused on developing an empirical understanding of criminal sentencing patterns (Chiricos and Waldo 1975; Clarke and Koch 1976; Hagan 1975). Prior to that time, few studies directly examined criminal sentencing or sentencing outcomes empirically (Frankel 1940), due primarily to the unreliability of and difficulty in obtaining relevant sentencing measures. Today, four decades later, there is a large body of empirical scholarship on trends and disparities in court sentencing.

Despite this diverse literature, the sentencing patterns related to environmental crimes and environmental offenders have received scant attention (Burns and Lynch 2004). Little is known about the types of environmental crimes brought before state and federal courts, the prevalence of those crimes, and the typical punishments handed down to environmental offenders. The small number of existing studies that have examined sentencing for environmental crimes have focused almost entirely on the punishment of corporate environmental violations (e.g., Cohen 1992; Atlas 2001; Stretesky 2006; Greife et al. 2015). However, corporate environmental crime most commonly results in non-criminal sanctions (Almer and Goeschl 2010; Stafford 2002). Prior studies thus provide only limited insight into how environmental offenses might be treated in criminal courts, except for the suggestion, which we discuss below, that environmental offenses are generically viewed or treated as less severe or less criminal offenses (e.g., Forsyth and Marckese 1993; Atlas 2001; Greife et al. 2015; see, however, Shelley et al. 2011).

Overall, a small number of aggregate analyses of sanctions for environmental crimes highlight that criminal punishment for environmental crime appears to be rare and lenient (Almer and Goeschl 2010). For example, a descriptive cross-national study by Billiet and Rousseau (2014) estimates that the U.S. averages roughly 350 federal environmental *criminal* cases a year, that 30 % of these cases result in a jail or prison sentence, and that the average sentence length for these cases is roughly 3.7 months. Notably, the authors estimate that only 11 % of all known environmental cases were handled criminally, as opposed to being handled through a civil or regulatory process. The authors also highlight

the fact that other countries may be similarly lenient with criminal sanctions for environmental offenders. Extant research indicates, for example, that 10 % of environmental cases in Belgium resulted in prison sentences, 0.6 % of cases led to prison sentences in the UK, and 0.5 % of cases led to prison sentences in the Netherlands (Billiet and Rousseau 2014). It is unclear, however, whether lower rates of incarceration may be driven by the overall less frequent use of incarceration in general in these countries compared to the U.S, or to some other set of factors which has yet to be identified.

Analyses of criminal sanctioning patterns for environmental crimes committed by individuals are even more limited in number. To our knowledge, a 2004 study by O'Hear provides one of the only existing empirical, comparative analyses of criminal sentencing trends for individuals convicted of environmental versus non-environmental crimes (see also Crow, Shelley, and Stretesky 2013 for an analysis of wildlife crime sanctions for individuals). The author examined variation in the likelihood of sentencing departures between "green collar" and traditional offenders under federal sentencing guidelines. Across a series of analyses, O'Hear consistently found that federal courts were more likely to depart downward from federal sentencing guidelines in instances when the federal offense was an environmental rather than a non-environmental case. Outside of O'Hear's study, no prior analysis has directly examined punishments for environmental offenses committed by individuals, nor compared those outcomes to non-environmental offenders.

More commonly, studies of environmental crimes committed by individuals have focused broadly on theoretical issues concerning how to best deter environmental offenders (Allan 1987; Almer and Goeschl 2010; McMurry and Ramsey 1986; Ogus and Abbott 2002; Stretesky et al. 2013); identifying characteristics of environmental offenders and their crimes (e.g., Crow et al. 2013; Eliason 2008); or assessing whether environmental sentences produce evidence of environmental injustice (Atlas 2001; Greife et al. 2015; Lavelle and Coyle 1992; Lynch et al. 2004; Ringquist 1998). These studies have advanced the literature on environmental crimes in important ways, but, taken together, suggest that little empirical knowledge exists that can identify precisely how formal social control actors view or treat environmental offenders, and how such treatment compares to that applied to other offender types.

Environmental Crime and Punishment—High Costs, Limited Empirical Knowledge

The inattention to environmental crime and attendant sanctioning is problematic in part because estimated costs of environmental crimes are particularly high. Scholarship asserts, for example, that the wide variety of environmental crimes committed by individuals, corporations, and governments cause more harm, and incur substantially higher fiscal costs than street crimes (e.g., Jarrell et al. 2013; Lynch 2013; Lynch et al. 2013). Estimates from the United Nations Environmental Programme (2014) support this claim—according to their estimates, the total costs of individual- and corporate-level illegal logging, illegal wildlife trade, and illegal fish catches net between $90 and $274 billion per year globally, which ranks second only to the global illegal drug trade market (Global Initiative, Global Initiative Against Transnational Organized Crime 2014).

Countless other examples of substantially high costs incurred by environmental crimes exist. Estimates indicate, for example, that the aggregated fiscal costs of pollution caused by corporations and individuals, together, are extensive. For California alone, estimated healthcare costs of treating pollution-related diseases reach $65 million per year (Romley et al. 2010). China's pollution problems produce perhaps the most notable environmental

crime-related costs. The World Bank (2007) estimates that the cost of mortality related to Chinese air pollution may be as high as $351 billion. More broadly, scholars have highlighted the fact that cost estimates of harm caused by individual- and corporate-level pollution and other environmental crimes are, at best, underestimated, and at worst, meaningless, due to the sobering possibility that environmental crimes cause ecological destruction and disorganization that is so extensive it threatens long term ecological stability and the extinction of various animal and plant species (Barnosky et al. 2011; Clausen and Clark 2005; Clausen and York 2008; Hoffmann 2004; Rockstrom et al. 2009; Steffen et al. 2007, 2011).

Our analyses focus specifically on environmental crimes committed by individuals and, in particular, those offenses for which individual offenders are caught and convicted. As such, our focus is on crimes that Situ and Emmons (2000) classify as "personal environmental crimes," which include ecological and wildlife/animal crimes committed by individuals without organizational or corporate affiliations (see pp. 113–120 for detailed discussion). Situ and Emmons argue that these types of crimes, on their own, are responsible for limited short term harm. Personal environmental crimes are, however, generically harmful over time and in the aggregate. With that said, systematic estimates of the harms resulting solely from various types of individual-level crimes typically processed in state courts are, to the best of our knowledge, non-existent (the estimates discussed above are based on aggregate estimated harms stemming from individual- and corporate-level crimes). We know little nationally or across states, for example, about the estimated fiscal costs of illegal dumping or poaching—two common types of environmental felony offenses processed by state courts. These and other environmental crimes regularly appear in reports from local and national news media (see, e.g., Hauserman 2002; Sanderson and Lopez 2015; Stennett 2012; Stepzinski 2013), but the general prevalence of these crimes, the precise frequency with which related criminal charges are brought before state courts, and the total damages these crimes incur have not been estimated.

Empirical analyses of sanctioning decisions for environmental offenders thus serve to provide a better understanding of how society members and court actors perceive and respond to environmental crimes in a context where little systematic knowledge exists about costs and harms. If, indeed, scant knowledge exists about the harms of environmental felony offenses (especially those commonly committed by individuals), on what basis are court-sentencing decisions for environmental offenders made? Examinations of court data cannot address this question directly, but comparative analyses of court decisions across different offense types (i.e., environmental versus non-environmental) can identify the patterns of sanctions assigned to environmental offenses and, indirectly, provide initial insight into how relatively harmful society members, states, and state courts perceive environmental offenses to be. For example, what crimes, in the perceptions of the state or, more practically, state sentencing guidelines, are most comparable to environmental felony offenses? How do state-designated sentencing guidelines intend to sanction environmental offenders and how do those sanctions compare to guidelines for other, comparable offense types? We explore these and related questions in our analyses and revisit the larger point—that of the relative treatment of environmental versus non-environmental offenses in state courts—in the paper's conclusion.

The Theory and Logic of (Lenient) Sentencing for Environmental Crimes

Despite the substantial estimated harms of environmental crimes, the conventional assumption in the literature—and the main hypothesis that informs our analyses—is that

"green" offenders receive relatively lenient treatment from the courts (Ogus and Abbott 2002; O'Hear 2004). This hypothesis is motivated by at least two lines of reasoning: (1) crimes against the environment are less prominent in local and state policy debates, thus, the harms are less well known to society members and this leads citizens—including state prosecutors and court judges—to perceive environmental crimes to be overall less threatening or dangerous than other crime types; and (2) corporate environmental crime sanctions receive more attention than environmental crimes committed by individuals and have established a precedent of leniency that likely informs state court sanctioning decisions. We briefly expand on these arguments below.

First, prior scholarship suggests that lenient sentencing is likely for environmental crimes because the harms of environmental crimes are less well known and less well understood compared to other crime types. Apart from catastrophes, environmental offenses receive less media and public policy attention than traditional offenses, like drug, violent, and sex crimes, granting the public limited insight into the costs and impacts of environmental crimes and limited access to knowledge about justice system responses to environmental crimes (Brisman 2013). In turn, court actors (i.e., prosecutors and judges) may be less familiar with harms associated with environmental crimes and less willing to pursue incarceration or other severe punishments for such crimes (see, however, Walters and Westerhuis 2013). Furthermore, due to the relative rarity of prosecution of environmental crimes (which we illustrate in our analyses), judges and prosecutors may perceive that punishments for environmental crimes are unlikely to deter or that deterrence itself is unnecessary (Almer and Goeschl 2010).

This hypothesis—that court actors perceive that environmental crimes pose limited harms or threats to community members and, consequently, hand down lenient sentencing decisions to environmental offenders—is supported by traditional theoretical frameworks that inform scholarship on criminal sentencing and sentencing disparities including focal concerns theory (Steffensmeier 1980) and other attributions perspectives (e.g., Albonetti 1997; Kautt and Spohn 2002; Kramer and Ulmer 2009). Such theories argue, for example, that several critical dimensions motivate court actors' decision-making, such as organization and practical constraints of a given court, the perceived culpability of any given offender, and also the perceived risk and danger posed by an offender to the community (e.g., Steffensmeier et al. 1998). This latter dimension may be particularly relevant for considering disparities between sentences for environmental offenders versus non-environmental offenders. Since environmental crime costs are not well known or well publicized, court actors will be more familiar with costs associated with conventional crimes and to more regularly perceive that the harms caused by, say, drug or property offenders, are more acute and more costly than the harms that result from environmental crime. Court actors will also be less likely to perceive that environmental offenders pose as much danger to society. Thus, if court actors do rely on "perceptual shorthands" or stereotypes that characterize offenders and offender dangerousness to facilitate rapid sanctioning decisions in overburdened court systems, as prior research would suggest (e.g., Spohn and Holleran 2000; Steffensmeier and Demuth 2000; see also, Kahneman 2011), we can anticipate logically that environmental offenders would receive more lenient punishments compared to their non-environmental offending counterparts.

Second, we anticipate more lenient sentences for environmental offenders because sanctioning decisions for corporations who violate environmental regulations (which occur more regularly) have established a precedent of leniency, which may influence sanctioning decisions for individuals. Scholars argue that punishment responses to corporate-level violations are lenient relative to the harms produced by those environmental violations

(e.g., Brickey 2001; Labaton 1989; Lazarus 1996). This leniency, in part, stems from the fact that cases typically play out in civil courts and are focused on organizations. Even when an individual is targeted in criminal court, prosecutions often target an individual with "significant operational authority and responsibility" within an organization (Brickey 2001:1103). In these latter instances, the individual is likely to be viewed as less criminally culpable and merely as an overseeing agent during the time period in which an offense was committed (Cohen 1992).

Regardless of its root cause(s), this precedent of leniency for corporate environmental offenders may influence or spillover into punishment decisions for individual offenders in state and federal courts when they are prosecuting individual environmental crimes. This is a working assumption in limited prior scholarship on environmental crimes and punishments. For example, O'Hear (2004) makes this argument in part, and suggests that examinations of criminal sanctions for environmental crimes are likely to reveal relative leniency for environmental offenders despite changes to sentencing guidelines over the past two decades that theoretically increased the ability of courts to punish environmental felony offenders more harshly (see, e.g., p. 210).

Analytic Strategy

In short, scholarly attention to the court and punishment experiences of environmental offenders has been limited. A handful of studies exist that assess non-criminal sanctioning patterns for corporate environmental violations and a smaller number of studies have assessed the unique characteristics of environmental offenders, but a significant gap exists in the literature in regards to criminal court responses to environmental crimes relative to what is known about the sentencing of non-environmental offenders. However, scholarship on environmental offending and social control responses has largely assumed that environmental offenders receive more lenient treatment from courts. Due to the lack of relevant empirical studies, there is little empirical evidence in support of those assertions.

This study addresses these theoretical and research gaps. Specifically, the analyses below will, first, provide a descriptive examination of the different types of environmental felony convictions processed through a single state's court system. Second, the analyses will turn to a precision matching approach to create matched samples for different types of environmental crimes and analyze differences in sentencing outcomes for environmental and non-environmental felony offenses. Although these analyses cannot directly test the mechanisms that cause disparities in punishment patterns (e.g., focal concerns dimensions, established legal precedents), they can be used to establish empirically whether the hypothesized leniency in court sanctions for environmental offenders exists.

To test for disparities, we utilize a precision matching approach. Matching methodologies are commonly used in the court sentencing disparities literature (e.g., Kurlychek and Johnson 2010; Bales and Piquero 2012a; Johnson and Kurlychek 2012; Franklin 2015). Precision (i.e., exact, perfect) matching provides an especially useful tool for estimating the "treatment" effect of offense type on sentencing decisions. This technique allows us to create a matched sample consisting of treated (environmental felony convictions) and control cases (non-environmental felony convictions), for which *control cases are identical to treated cases* on all measured covariates except for the offense type, after matching. The precision matching technique is more rigorous than a traditional regression design for assessing this type of treatment effect, and it is the most rigorous form of

matching analysis (e.g., Bales and Piquero 2012b; Guo and Fraser 2010; Nagin et al. 2009). Propensity score matching, for example, reduces matching covariates to a single score, based on individuals' estimated propensity to receive treatment. The precision matching technique eliminates the need for this data reduction by exactly matching control cases to treated cases variable-by-variable. Any control case included in the matched sample will have an identical matched counterpart, based on the variables included in the matching algorithm, among cases in the treatment group. Our analysis will utilize 1:k matching, which means that we include all exactly matched control cases in the matched sample and then use weights in all subsequent analyses to account for this oversampling of control cases (for additional details on precision matching procedures see Bales and Piquero 2012b; Guo and Fraser 2010).

Precision matching can sometimes be problematic compared to propensity score matching or other designs, such as coarsened exact matching (e.g., Blackwell et al. 2009), due to the "curse" of dimensionality that arises when precision matching is utilized with a large number of matching covariates. When sample size is limited, identifying a sufficient number of exactly matched cases may be impossible (e.g., Bales and Piquero 2012a; Savolainen et al. 2013). The data and research question for this project are uniquely suited for precision matching, however, because of the substantially large number of cases in our sample and because the ratio of treated (environmental) to control (non-environmental) cases is ideal due to the fact that we have a substantially larger pool of control cases from which we can identify matches. As illustrated below, we identified at least one exact match for nearly every environmental felony conviction in the sample.

Precision matching is also useful for addressing a primary challenge related to examining potential disparities in sentencing for environmental offenders—identifying a valid control group. What other offender types are comparable to environmental offenders? Here, a matching design allows us to create a control group empirically. As we describe further below, we incorporate a range of matching variables, including demographic information, prior record, and offense characteristics, which are important for creating comparable environmental and non-environmental offender groups.

We also include sentencing guidelines scores, including the state-assigned offense severity score, which is formally assigned in accordance with the Florida Sentencing Guidelines based on the most serious statute violation linked to a given offender's conviction. The severity score is especially useful for our purposes. In Florida, offense severity scores are pre-assigned to each felony statute violation in accordance with state sentencing commission guidelines. Offense severity scores are thus comparable across crime types. For example, a felony property offense that receives a severity score of 5 is comparable, according to the state, to any other offense that receives the same score (such as an environmental offense). Matching on this score and other legal and extra-legal factors allows us to rigorously account for potential confounders that affect sentencing and to assess the impact on sentencing of committing an environmental offense compared to other similarly severe offenses of other types, all else equal. In theory, any remaining differences between environmental and non-environmental sanctions are due to other influences, including possible differences in the perceptions of environmental versus non-environmental crimes held by judges and prosecutors. More detailed descriptions of all of the matching variables are provided below.

For these analyses, we created two categories of environmental felony offenses—ecological crimes and wildlife/animal crimes—to assess whether disparities between environmental and non-environmental sanction types differ depending on the general category of environmental crime under consideration. Although there is no consistently agreed upon

typology of environmental crimes, our categorization follows the lead of prior work in this area. Specifically, South et al. (2013) suggest that there are four broad categories of green crimes: (1) crimes of air pollution, (2) crimes of deforestation, (3) crimes against animals, and (4) crimes of water pollution. Due to the nature of our data, which provide limited cases for certain kinds of offenses and which focus on acts by individuals, not corporations, we necessarily had to collapse these categories or exclude them (for example, we had no deforestation crimes). We collapsed crime types 1 and 4 into "ecological" crimes, which represent acts against ecosystems (but can, of course, cause secondary victimization to animals). We retained crime 3 (crimes against animals) as a separate category, in part because we had sufficient cases to do so and because such crimes are qualitatively different in that they involve direct harm to animals.

As part of the matching analysis, we present information on the results of the matching procedure, including an examination of the most common types of non-environmental felony convictions that were found to be precise matches to the environmental felony convictions. Our analyses employ a 1:k (one to many) matching design. Ancillary analyses using 1:1 precision matching identified similar substantive findings, but provided less statistical power. For each stage, we conduct two separate analyses, one using a matched sample of ecological and non-environmental sentencing events, and one with a matched sample of wildlife/animal and non-environmental sentencing events. We then compare the probabilities of assignment of different punishments between treated and control cases and assess the robustness of these comparisons using the matched samples in multinomial logistic regression models. These models control for the sentencing year and the judicial circuit in which the sentencing occurred, to account for the clustering of sentencing events within years and within judicial circuits.

Data and Measures

The analyses utilize data from the state of Florida Sentencing Guidelines database, which incorporates data from the Florida Department of Corrections and the Florida Department of Law Enforcement. Data for this study include all felony conviction sentencing events processed through state courts in Florida from 1994 to 2011 (N = 1945,816). These are sentencing events linked to crimes committed by individuals, not organizations or corporations, and the vast bulk of these crimes were most likely committed by individuals without organizational affiliations. (Corporate and organizational environmental crimes are more likely to be investigated and processed by the federal government and the Environmental Protection Agency, and not the state of Florida.) As discussed earlier, in the typology of environmental offenses types, these would be best defined as felony-level, personal environmental crimes (for further discussion, see Situ and Emmons 2000: 113–120), which include a range of ecological and wildlife/animal crimes committed by individuals.

The Florida data provide important details about the individual, his/her prior criminal record, and his/her offense information. The independent (treatment) variable is the offense type for which a given felony offender was convicted. The offense categories include traditional categories of violent, property, drug, sex, and other offenses. From these categories, we used specific state statute information provided in the data to identify environment-related crimes or crimes that were environmentally harmful. We systematically

identified any such felony convictions to create new designations of environmental offenses.[1]

Table 1 provides a detailed breakdown of the specific felony offense types under each environmental crime category. Ecological crimes include 1744 felony convictions over the study period. Inspection of the table reveals that, by far, the most prevalent ecological crime type is illegal dumping of more than 500 lb, which accounts for 92 % of ecological felony convictions in the state of Florida. Ecological felony convictions also include potentially more serious, but rare offense types, such as illegal storage, transportation, or release of hazardous waste, and also illegal land burning and setting of wildfires. The second environmental crime category, wildlife and animal crimes, includes offenses like animal cruelty, which accounts for roughly 58 % of these charges, and a variety of other crimes against animals including illegal poaching and gambling that involves animals.

The data also include other detailed covariate measures that may inform judge and prosecutor decision-making and that align with commonly used measures in prior sentencing research (e.g., Bales and Piquero 2012b; Franklin 2015). All of these covariates are incorporated in the precision matching algorithm. Specifically, the analyses include measures of individuals' sex (male = 1, female = 0), a continuous measure of age at the time of sentencing, and dummy variable measures of race and ethnicity (non-Latino White, non-Latino Black, Latino).

Cases were also matched using state-designated offense severity scores. As described above, we utilize an offense severity measure provided by the Florida Sentencing Guidelines database to account for the association between offense severity and sanction assignment. The Florida guidelines assign prescribed point values to an individual's sentencing score based on the specific statute violation and the relative seriousness of that violation based on the Florida Criminal Punishment Code (CPC; see Florida Department of Corrections and Office of the State Courts Administrator 2012). These severity scores are assigned a priori, having been determined by the Florida Sentencing Commission, and are absolute—that is, the severity scores are comparable across crime types. The Sentencing Guidelines in Florida assign each individual statute violation a severity level from 1 to 10 and these levels are then prescribed scores, with higher scores given to violations that are defined as more serious based on the nature of the offense and the estimated harm to the community caused by any given statute violation (according to the Sentencing Commission and the CPC). (For more information about the guidelines, see below and also http://www.dc.state.fl.us/pub/sen_cpcm/cpc_manual.pdf). To further account for the seriousness of a given offense, we also include a dummy variable indicator of whether there was any form of injury to a human victim resulting from the offense.

The sentencing process in Florida provides a unique scenario for this study. This process involves totaling the various scores (prior record, offense severity, victim injury, etc.) we have included in the matching algorithm to create a total that, in accordance with the CPC, indicates the lowest permissible sentence that a court can provide "absent a valid reason for departure" (Florida Criminal Punishment Code 2012:13). Specifically, an individual who scores greater than 44 points is one who has "scored" to prison (i.e., prison is the recommended sentence). A score of 44 points or lower translates into a recommendation of

[1] These data did not contain any flag indicating the environmental cases. Instead, the data identified the specific statute violation for each sentencing event. We investigated a list of all statute violations recorded in the dataset over this period of time and identified any violations associated with ecological, animal, or other environmental harm.

Table 1 Detailed breakdown of Florida environmental felony convictions, 1994–2011

Type I. Ecological crimes (n = 1744)	N	Type II. Wildlife and animal crimes (n = 1415)	N
Dumping/littering, more than 500 lb	1609	Animal cruelty	815
Intentionally or recklessly burn land	52	Gambling involving the use of animals	292
Store hazardous waste without permit	32	Alligator poaching	144
Cause pollution harmful to humans	22	Illegal netting	66
Illegally transport hazardous waste	12	Crab trapping without a permit	45
Willfully set wildfire	9	Kill or maim an animal	18
Knowingly release hazardous waste	4	Illegal use of projectile to take an animal	8
False statement about hazardous waste	2	Molest, wound, kill sea turtle, nest, eggs	5
Install illegal fuel container	1	Possess deer or game animal illegally	4
Violation of Florida radiation statutes	1	Molest, wound, kill spiny lobster	3
		Kill or wound endangered species	2
		Taking of other sea product without license	2
		Fishing and hunting license fraud	1
		Illegally kill domestic animals for pelts	1
		Shrimping violation	1

a non-prison sanction, which includes probation, community control, jail, or other sanctions. As described above, however, judges can depart in either direction from these recommendations if they provide justification.[2] Thus, the use of the severity score in accordance with the CPC and the ability for judges to depart from the CPC's sentence recommendations provides an ideal scenario for our study because the Florida guidelines data provide rigorous control measures for precision matching, but at the same time there is variation in actual sanctions imposed that allow for potential biases and disparities to emerge after matching.

We include three measures of an offender's prior criminal record: a count measure of prior misdemeanor offenses, a count measure of prior felony convictions, and a dummy variable indicator of whether the offender has previously violated probation or parole conditions (1 = prior violation, 0 = no prior violations; we were not provided a measure of the number of supervision violations accrued). Last, we control for whether the conviction resulted from a trial or plea bargaining process (1 = trial, 0 = plea bargaining).

The dependent variable of interest is a five-category measure of criminal sanction type. Felony convictions during this time period resulted in one of the following punishments: "other" sanction (e.g., fine, community service), probation, intensive probation, jail, and prison. In Florida, intensive probation is typically referred to as "community control," which is a more serious form of probation that involves greater surveillance and restrictions for a given individual. We use the more common terminology (i.e., "intensive probation") in the paper to clearly delineate it from conventional probation.

[2] Including the total sentencing score as an additional matching variable would be redundant and result in an identical matched sample because we already include each component (e.g., prior record measures, offense severity) of the score separately in the matching algorithm.

Findings

An Empirical Description of Environmental Felony Convictions

Table 2 provides a series of descriptive statistics for the full sample, and then for three subsamples: ecological offense types, wildlife and animal offense types, and non-environmental offense types. Given the lack of research on individual, felony-level environmental crimes, these descriptive results are important in and of themselves because they provide an empirical portrait of environmental versus non-environmental offenders.

Inspection of Table 2 reveals several important findings. First, felony-level environmental offenders appear in state courts relatively rarely. Together, ecological and wildlife/animal felony offenses represent less than 1 % of all felony convictions during our study period. This aligns with prior scholarship reviewed earlier that indicates environmental crimes typically are not detected, investigated, or criminally charged. Thus, the subsequent analyses are even more useful. By leveraging a large dataset of felony convictions over a long period of time, we are able to capture a large enough pool of environmental felony convictions to identify patterns.

Across the full sample, the demographic and case characteristics align with prior analyses of felony sentencing events. The majority of cases involve males (81 %), and most offenders are either white (49 %) or black (41 %), with a small but non-negligible percent of convictions for Latinos (10 %). Overall, offenders in the full sample averaged roughly 0.24 prior supervision violations, 1 prior misdemeanor (1.17), and 1 prior felony conviction (1.08). A negligible percentage of felony convictions were decided via trial (2 %).

Columns 2–4 in Table 2 provide comparisons across the two types of environmental crimes and then the control sample of non-environmental crimes. Unique and substantive differences between the offense types are evident. For example, and as expected, we see overall lower average severity scores for ecological (7.19) and wildlife and animal crimes (10.94) compared to non-environmental crimes (24.45). This difference in the designation of severity scores, which are predetermined according to state sentencing guidelines, suggests that the state may view many "green" offenses as overall less serious than non-environmental crimes. Environmental offenders are also overall older, and contain higher percentages of Latino offenders than non-environmental crimes, and substantially lower percentages of black offenders.

Not least, comparisons across the punishment outcomes for ecological, wildlife and animal, and non-environmental crimes reveal patterns that support the hypothesis that courts treat environmental felony offenses more leniently than non-environmental crime types. Prison sentences, for example, are considerably less likely for ecological (2 %) and wildlife/animal offenses (9 %) than for non-environmental crimes (22 %). By contrast, environmental offenders receive probation sentences far more frequently (ecological—71 %; wildlife and animal—68 %) compared to non-environmental offenders (45 %).

Precision Matching Analyses

The differences in the proportions of sentence types and the overall more severe punishments for non-environmental crimes could be due to compositional differences between offender groups and also differences in the overall severity of environmental versus non-environmental crimes rather than any court actor bias that leads to leniency towards

Table 2 Descriptive statistics

	Full sample (N = 1945,816)				Ecological (N = 1744)				Wildlife and animal (N = 1415)				Non-environmental (N = 1942,657)			
	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
Offense type																
Ecological (1/0)	0.002	0.03	0	1	–	–	–	–	–	–	–	–	–	–	–	–
Wildlife (1/0)	0.001	0.03	0	1	–	–	–	–	–	–	–	–	–	–	–	–
Violent (1/0)	0.19	0.39	0	1	–	–	–	–	–	–	–	–	0.19	0.39	0	1
Property (1/0)	0.33	0.47	0	1	–	–	–	–	–	–	–	–	0.33	0.47	0	1
Drug (1/0)	0.35	0.48	0	1	–	–	–	–	–	–	–	–	0.35	0.48	0	1
Sex (1/0)	0.02	0.13	0	1	–	–	–	–	–	–	–	–	0.02	0.14	0	1
Other (1/0)	0.11	0.31	0	1	–	–	–	–	–	–	–	–	0.11	0.31	0	1
Matching variables																
Male (1/0)	0.81	0.39	0	1	0.98	0.14	0	1	0.89	0.31	0	1	0.81	0.39	0	1
Age (continuous)	31.85	10.51	10	100	38.78	11.38	17	94	35.44	13.21	16	88	31.84	10.51	10	100
White (1/0)	0.49	0.50	0	1	0.48	0.50	0	1	0.60	0.49	0	1	0.49	0.50	0	1
Black (1/0)	0.41	0.49	0	1	0.29	0.45	0	1	0.23	0.42	0	1	0.41	0.49	0	1
Latino (1/0)	0.10	0.30	0	1	0.23	0.42	0	1	0.16	0.37	0	1	0.10	0.30	0	1
Severity points (count)	24.43	18.50	0	841	7.19	3.38	4	22	10.94	6.17	4	36	24.45	18.50	0	841
Victim injury (1/0)	0.07	0.25	0	1	0.00	0.03	0	1	0.01	0.10	0	1	0.07	0.25	0	1
Prior violations (1/0)	0.24	0.43	0	1	0.15	0.35	0	1	0.15	0.36	0	1	0.24	0.43	0	1
Misdemeanors (count)	1.17	1.56	0	10	0.79	1.37	0	9	0.98	1.49	0	10	1.17	1.56	0	10
Felonies (count)	1.08	1.50	0	10	1.10	1.55	0	8	0.61	1.16	0	8	1.08	1.50	0	10
Trial (1/0)	0.02	0.12	0	1	0.01	0.10	0	1	0.03	0.18	0	1	0.02	0.12	0	1
Sanction type																
Other (1/0)	0.01	0.12	0	1	0.02	0.15	0	1	0.02	0.15	0	1	0.01	0.12	0	1
Probation (1/0)	0.45	0.50	0	1	0.71	0.45	0	1	0.68	0.47	0	1	0.45	0.50	0	1

Table 2 continued

	Full sample (N = 1945,816)				Ecological (N = 1744)				Wildlife and animal (N = 1415)				Non-environmental (N = 1942,657)			
	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
Intensive probation (1/0)	0.08	0.27	0	1	0.03	0.16	0	1	0.06	0.23	0	1	0.08	0.27	0	1
Jail (1/0)	0.24	0.43	0	1	0.21	0.41	0	1	0.15	0.35	0	1	0.24	0.43	0	1
Prison (1/0)	0.22	0.41	0	1	0.02	0.15	0	1	0.09	0.29	0	1	0.22	0.41	0	1

environmental felons. To account for this possibility, we now turn to the results of precision matching analyses that account for potential selection bias caused by the measured covariates. Table 3 includes the results of precision matching for two different matching procedures: (1) ecological versus non-environmental crimes and (2) wildlife/animal versus non-environmental crimes.

Broadly, we were able to identify precise matches from the non-environmental felony pool for nearly every environmental offense. Specifically, Table 3 shows that 1693 ecological cases were matched out of 1744 total cases (97 %) and 1363 wildlife and animal cases were matched out of 1415 total cases (96 %). The unmatched cases were excluded from subsequent analyses. Comparisons of the descriptive statistics presented in Table 3 for the matching variables between treated and control cases reveal that the precision matching procedure worked to create exactly matched samples, as treatment and control cases are identical in their mean values across each matching covariate. Weights are used here and in the multinomial regression analyses because of the unbalanced sample size resulting from the one-to-many matching procedure.

The most common type of non-environmental crime matched to ecological crimes was property crimes, followed by "other," and drug crime types. By contrast, the most common offense types matched to wildlife and animal crimes were drug crimes followed by "other," and then property crimes. Overall, the matched samples for ecological crimes included less severe offenses compared to the matched sample for wildlife and animal crimes (7.19 severity score versus 10.95 severity score, respectively).

Using the precisely matched samples we can make comparisons, using a standard difference of means test, in the proportion of cases assigned to different sanction types across treatment and control cases. For ecological crimes, using a two-tailed *t* test, we find that differences between matched environmental and non-environmental crimes in the proportion of cases assigned to each sanction type are statistically significant in every instance. That is, ecological offenses result in slightly more "other" sanctions (2 vs 1 %), substantially more probation (72 vs 57 %), slightly less intensive probation (3 vs 4 %), substantially less jail (21 vs 28 %), and substantially less prison (2 vs 9 %). Generically, compared to a matched sample of non-environmental offenders, ecological offenders received overall more lenient sanctions, and lower probabilities of incarceration-based sanctions in particular.

The matched analyses for wildlife and animal crimes compared to non-environmental crimes revealed a partially different pattern of results. Like ecological crimes, wildlife/animal crimes led to a larger proportion of probation sentences than matched non-environmental crimes (68 vs 61 %). At the same time, and in direct contrast to the leniency assumption, wildlife and animal crimes resulted in a slightly larger proportion of prison sentences (8 %) compared to non-environmental offenses (6 %). With jail included, however, wildlife and animal crimes resulted in fewer incarceration (jail and prison) sentences overall.

In short, ecological crimes and wildlife/animal crimes result in more lenient sentencing, with both offense types receiving substantially greater proportions of probation than incarceration compared to non-environmental crimes. This finding is, however, nuanced, with wildlife/animal offenders receiving harsher penalties in some instances. As we discuss in the conclusion, this may be due to the perception among judges and prosecutors that crimes against wildlife and animals are more serious or violent than other types of environmental crimes.

Table 4 presents a parallel set of results from two multinomial logistic regression analyses using a five-category sanction outcome measure. These models assess the

Table 3 Post-matching descriptive statistics and two-tailed difference of means tests for sanction types using matched samples

	Ecological								Wildlife and Animal							
	Treatment (N = 1693)				Control (N = 111,241)				Treatment (N = 1363)				Control (N = 191,981)			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Offense Type																
Ecological	1	0	1	1	–	–	–	–	–	–	–	–	–	–	–	–
Wildlife	–	–	–	–	–	–	–	–	1	0	1	1	–	–	–	–
Violent	–	–	–	–	0.02	0.15	0	1	–	–	–	–	0.02	0.16	0	1
Property	–	–	–	–	0.61	0.49	0	1	–	–	–	–	0.20	0.40	0	1
Drug	–	–	–	–	0.11	0.31	0	1	–	–	–	–	0.55	0.50	0	1
Sex	–	–	–	–	0.00	0.06	0	1	–	–	–	–	0.00	0.05	0	1
Other	–	–	–	–	0.25	0.44	0	1	–	–	–	–	0.22	0.41	0	1
Matching variables																
Male	0.98	0.14	0	1	0.98	0.14	0	1	0.89	0.31	0	1	0.89	0.31	0	1
Age	38.44	11.09	17	76	38.44	11.09	17	76	35.00	12.76	16	78	35.00	12.76	16	78
White	0.49	0.50	0	1	0.49	0.50	0	1	0.61	0.49	0	1	0.61	0.49	0	1
Black	0.29	0.45	0	1	0.29	0.45	0	1	0.23	0.42	0	1	0.23	0.42	0	1
Latino	0.23	0.42	0	1	0.23	0.42	0	1	0.15	0.36	0	1	0.15	0.36	0	1
Severity points	7.19	3.39	4	22	7.19	3.39	4	22	10.95	6.17	4	36	10.95	6.17	4	36
Victim injury	0.00	0.03	0	1	0.00	0.03	0	1	0.00	0.05	0	1	0.00	0.05	0	1
Prior violations	0.14	0.34	0	1	0.14	0.34	0	1	0.15	0.36	0	1	0.15	0.36	0	1
Misdemeanors	0.76	1.31	0	9	0.76	1.31	0	9	0.95	1.43	0	10	0.95	1.43	0	10
Felonies	1.06	1.49	0	8	1.06	1.49	0	8	0.58	1.11	0	8	0.58	1.11	0	8
Trial	0.01	0.08	0	1	0.01	0.08	0	1	0.02	0.13	0	1	0.02	0.13	0	1
Sanction types																
Other	0.02*	0.15	0	1	0.01	0.12	0	1	0.02*	0.15	0	1	0.01	0.12	0	1
Probation	0.72***	0.45	0	1	0.57	0.49	0	1	0.68***	0.46	0	1	0.61	0.49	0	1

Table 3 continued

	Ecological								Wildlife and Animal							
	Treatment (N = 1693)				Control (N = 111,241)				Treatment (N = 1363)				Control (N = 191,981)			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Intensive probation	0.03***	0.16	0	1	0.04	0.20	0	1	0.06	0.23	0	1	0.05	0.23	0	1
Jail	0.21***	0.41	0	1	0.28	0.45	0	1	0.15***	0.36	0	1	0.26	0.44	0	1
Prison	0.02***	0.15	0	1	0.09	0.28	0	1	0.08**	0.28	0	1	0.06	0.24	0	1

Sampling weights are included to account for unbalanced matched samples resulting from 1:k matching procedure

* $p < .05$; ** $p < .01$; *** $p < .001$, two-tailed t test, using sampling weights, comparing treatment and control groups

robustness of the sentencing patterns identified above by accounting for the judicial circuit and the sentencing year of any given felony sentencing event.[3] Dummy variables representing each judicial circuit and each sentencing year were included in the models, but the coefficients have been excluded from the tables to conserve space (available upon request). Probation serves as the outcome measure's reference category. Panel A presents the results using the ecological crimes matched sample and panel B presents parallel results for the wildlife and animal crimes matched sample. Across both analyses, results reinforce those identified using means differences tests. Specifically, both ecological and wildlife/animal crimes were significantly more likely than comparable non-environmental offenders to receive "other" sanctions, and significantly less likely to receive jail sentences. The difference in the effect on state prison incarceration also emerges here—ecological offenders are less likely to receive prison and wildlife/animal offenders are significantly more likely to receive prison.[4]

Figure 1 illustrates the results in a more intuitive manner by presenting predicted likelihoods of sanction assignment based on the models in Table 4 (all other covariates held to their means). Across the two figures we can see that the largest disparities emerge for probation. Ecological offenders have a likelihood of probation assignment that is 13 % points higher than that of non-environmental offenders. Jail is the next most likely sanction, and results in the second largest disparity for ecological offenders and the largest disparity for wildlife/animal offenders. "Other" sanctions (e.g., fines, community service) are less likely, and it is plausible that these much lower-grade sanctions are reserved for misdemeanor level offenses and are not often used for felony offenders. Last, the patterns of incarceration remained the same as in the means comparison—we can see a substantially reduced likelihood of imprisonment for ecological offenders, and slightly greater likelihood of imprisonment for wildlife/animal offenders.

Finally, the fact that we were able to identify precise matches to non-environmental felony convictions for the vast bulk of environmental felony convictions underscores a broader question—according to the state courts or state sentencing guidelines, who is most comparable to environmental offenders? And, based on these results, which offender types are receiving harsher or more lenient treatment compared to environmental offenders? We can answer these questions by looking across the (exactly) matched, non-environmental offenders in our analyses. This is an important exercise for theory and policy. The comparison provides useful insight into the various offense types that receive similar consideration, or are considered to be of similar levels of seriousness as environmental offenses, according to state sentencing guidelines in Florida. In other words, the matched, non-

[3] We conducted a series of ancillary analyses that included judicial circuit as a matching variable. Judicial circuit may be particularly important as a "local" control (see Heckman, et al. 1997; Cook et al. 2008); that is, a control for potential variation across judicial circuits in judge and prosecutor treatment of environmental and non-environmental offenders. However, matching within judicial circuits is restrictive and caused a reduction in our matched sample from 112,934 cases for ecological crimes to 20,310, and from 193,344 cases for wildlife crimes to 26,726. Notably, however, the results of these ancillary analyses were substantively the same for these more restrictive analyses (i.e., judicial circuit included as a matching variable) as those reported in the paper. In particular, we found similar "gaps" in sentencing outcomes between environmental and non-environmental offenders. These results are available upon request from the first author.

[4] We also conducted a series of robustness checks. First, we ran ancillary analyses where we matched and analyzed only the most common offense types under ecological (dumping and littering, over 500 lb) and wildlife/animal crimes (animal cruelty). Results were substantively the same as those shown in the analyses. We also conducted an analysis focused only on non-animal cruelty wildlife/animal crimes. Results were substantively the same except there was no longer a statistically significant increased likelihood of incarceration for wildlife and animal crimes. This suggests that the increased likelihood of incarceration is largely driven by the animal cruelty charges, which constitute the vast bulk of offenses within that category.

Table 4 Multinomial logistic regression of environmental conviction on five-category sanction outcome

	Other Sanction		Community Control		Jail		Prison	
	b	S.E	b	S.E	b	S.E	b	S.E
Panel A								
Treatment = ecological crime	0.522**	(0.166)	−0.597***	(0.152)	−0.512***	(0.062)	−1.405***	(0.169)
Judicial circuit dummy variables	–	–	–	–	–	–	–	–
Sentencing year dummy variables	–	–	–	–	–	–	–	–
Intercept	−2.509***	(0.089)	−2.935***	(0.084)	−0.671***	(0.033)	−1.469***	(0.048)
N	112,934							
Log pseudolikelihood	−114,109.66							
Pseudo R-squared	0.0667							
Panel B								
Treatment = wildlife/animal crime	0.364*	(0.180)	−0.031	(0.119)	−0.661***	(0.079)	0.206*	(0.102)
Judicial circuit dummy variables	–	–	–	–	–	–	–	–
Sentencing year dummy variables	–	–	–	–	–	–	–	–
Intercept	−2.634***	(0.064)	−3.042***	(0.057)	−0.755***	(0.024)	−2.453***	(0.044)
N	193,344							
Log pseudolikelihood	−187,829.22							
Pseudo R-squared	0.0601							

To conserve space, coefficients for dummy variables for judicial circuit and sentencing year dummy variables not shown

* $p < .05$; ** $p < .01$; *** $p < .001$; sanction type—probation serves as the reference category of the outcome measure

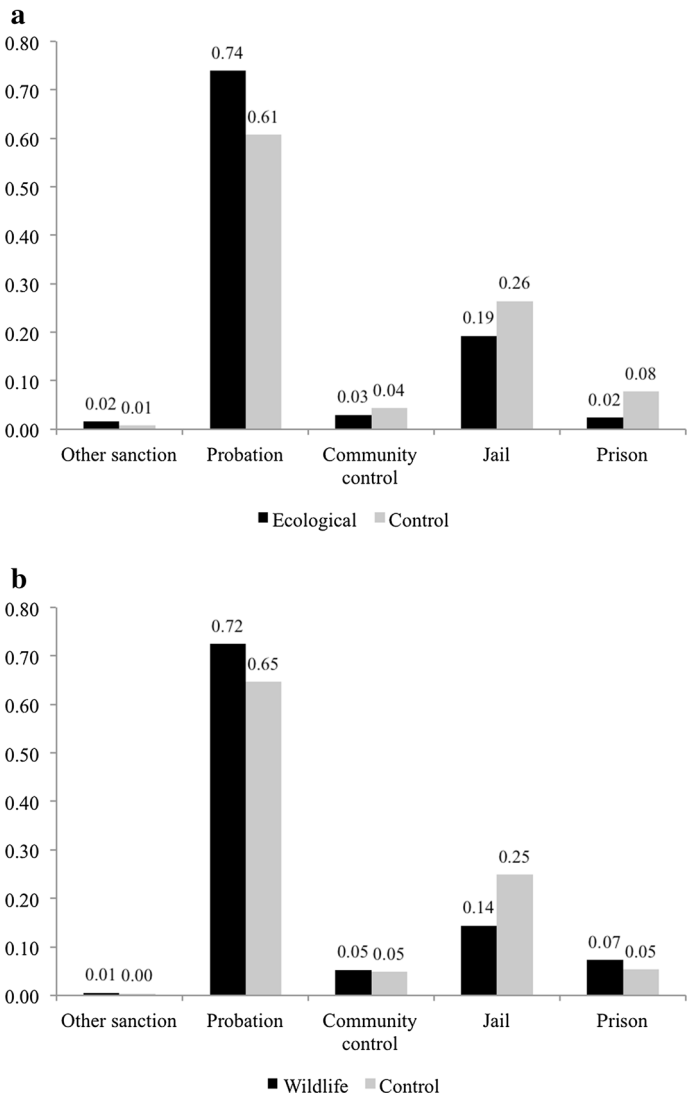

Fig. 1 Predicted likelihoods of each sanction type, **a** ecological crime, **b** wildlife and animal crime

environmental offenders are theoretically the offenders who are most comparable to the environmental offenders based on our matching algorithm. In addition, by examining the comparable offender types after matching on the covariates, as opposed to simply comparing offense severity scores, we are better simulating actual considerations made by state courts, which are affected by both legal and extralegal factors included in our analysis.

Table 5 addresses this question by listing the most common, non-environmental offense types present in the matched, non-treatment group for ecological and, separately, wildlife and animal offenders. Inspection across the two lists provides unique insight about state and court actors' treatment of environmental crimes. The top two offense types matched to ecological crimes were grand theft of property valued less than $5000 (29 % of matched

cases) and driving with a revoked license (23 % of matched cases). For wildlife and animal crimes, the most frequently matched offense type was cocaine possession (28 %) and driving with a revoked license (16 %). More generally, across both lists we see that precisely matched non-environmental offenses included a mix of lower level property crimes (e.g., petit theft, forgery) and lower level drug crimes. The only violent offense type to appear on either list is "simple battery, second offense," which matched to ecological crimes. These lists suggest that environmental crimes in Florida compare most similarly, according to state-designated offense severity scores and other factors, to minor property and drug crimes. By extension, we find that environmental crimes receive overall more lenient sanctions than these types of crimes.[5]

Ancillary Analyses

The analyses and findings described above provide insight into sentencing differences that exist between environmental and non-environmental offenses. What about sentencing differences that might exist *among* environmental offenses? Comparing sentencing outcomes across environmental crime types (i.e., comparing ecological and wildlife/animal crime sanctions) is more challenging because cases are limited. We did, however, conduct ancillary matching analyses comparing sentencing outcomes for ecological versus wildlife and animal offenders. Results of these analyses are included in "Appendix 1". These analyses revealed that it was difficult to identify matches—only 289 of the 1415 wildlife and animal offenders could be matched to ecological offenders—and that the vast bulk of matched environmental offenders of each type received probation. The results do provide modest support for the idea that wildlife and animal offenders receive overall harsher sentences than ecological offenders. The increased severity in this comparison, though, is substantively small. For example, matched ecological offenders received slightly more "other" sanctions and slightly less community sanctions. No matched ecological offenders received prison, compared to roughly 3 % of matched wildlife/animal offenders.

We also explored analyses of predictors of sentencing outcomes for environmental and non-environmental offenders. The purpose here is to identify whether variation between these two groups exists in the dimensions most strongly associated with court sentencing outcomes. Such an examination can help provide insight into the causes of sentencing gaps or disparities and potentially pinpoint mechanisms, such as biases in perceptions or differences in perceived harms that influence sentencing decisions. This type of analysis is a challenge here, however, due to data restrictions. The Florida guidelines data do not include any direct perceptual measures or variables that might otherwise be used to tap into key theoretical or focal concerns dimensions. We did conduct a range of analyses using our matching variables above as predictors of sentencing outcomes separately for environmental and non-environmental offenders. Results for one such analysis are included in "Appendix 2", where we conducted two logistic regression analyses predicting a prison sentence for environmental and non-environmental offenses. We identified three statistically significant coefficient differences between these two groups: age, offense severity

[5] One of the anonymous reviewers observed that the prevalence of drug crimes among the most frequently matched non-environmental crime types may be reflective of the Florida criminal punishment code treating crimes with indirect victimizations similarly. This is quite plausible and raises additional questions about why judges and prosecutors would treat ecological offenses leniently. In addition, the reviewer raised the point that if courts move to reduce prison sentences for drug offenders, the disparity between environmental and non-environmental offenses may change over time. We concur and would underscore the need for research that considers how changes in sentencing trends over time impact environmental crimes, if at all.

Table 5 Top 20 matched offense types of matched (controls) non-environmental crimes

Control case types matched to ecological crimes	%	Control case offense types matched to wildlife and animal crimes	%
Grand theft, 3rd degree (<$5000)	29.38	Cocaine possession	28.35
Driving with a revoked driver's license	22.71	Driving with a revoked driver's license	16.42
Uttering a forged instrument	5.76	Possession of a controlled substance	8.32
Marijuana possession (>20 g)	4.49	Marijuana possession (>than 20 g)	5.58
Writing worthless checks	3.74	Sale or manufacture of marijuana	5.03
Petit theft (3rd conviction)	3.25	Writing worthless checks	3.40
Forgery	2.39	Unauthorized use of a driver's license	2.20
Unauthorized use of a driver's license	2.39	Obtaining a controlled substance by fraud	1.97
Criminal mischief	1.80	Petit theft (3rd conviction)	1.65
Cocaine possession	1.71	Organized fraud (<than $20,000)	1.23
Marijuana possession, intent to sell	1.59	Cocaine possession, intent to sell	1.23
Fraud with a credit card	1.50	Grand theft, 3rd degree (<than $5000)	1.19
Uttering forged bills	1.50	Marijuana possession, intent to sell	1.15
Possession of a controlled substance	1.25	Possession of methamphetamine	1.13
Simple battery, second offense	1.00	Attempting to elude a police officer	1.00
Fraud to increase material benefits	0.85	Burglary of an unoccupied structure	0.95
Fraud of a person leasing property	0.66	Grand theft, 3rd degree (<$10,000)	0.92
Cocaine possession, intent to sell	0.63	Obstruction of a criminal investigation	0.85
Attempting to elude a police officer	0.62	Felony DUI, 3rd conviction	0.78
Sale or manufacture of marijuana	0.56	Possession of heroin (<10 g)	0.75

score, and prior community supervision violations. Group variation in this latter dimension is especially interesting because it suggests that when courts do hand down severe sanctions to environmental offenders, it may be more likely to be a court's harsh response to an offender who has violated the terms of their community supervision (or who has a history of such violations) and less to do with any push to punish a given environmental offender severely or courts' perceptions that committing an environmental crime may be indicative of an individual who is especially dangerous or threatening.[6] This analysis, however, provides a rather crude assessment of the potential intervening mechanisms and, as we discuss in the conclusion, substantially more research is needed that can tap directly into perceptions of environmental crimes and the mechanisms that lead to disparities in sentencing outcomes between environmental and non-environmental crimes.

Discussion and Conclusions

Scholarship on environmental crime has identified a range of serious and diverse harms that result from environmental criminal offenses. Juxtaposed against those harms is a lack of systematic empirical assessments of the formal social control responses to

[6] We also explored these analyses further by testing differences in coefficients based on multinomial logistic regression analyses. Substantive results were similar to what is shown in "Appendix 2".

environmental, or "green," crimes and how those responses compare to responses to non-environmental crimes (Cohen 1992; Lynch et al. 2014). Accordingly, the common assumption among researchers that environmental offenders receive relatively lenient treatment from criminal courts has gone largely untested (O'Hear 2004).

The goal of this paper was to advance theory and research on environmental crime and punishment by examining patterns in criminal sanctioning across crime types and to determine whether, after matching environmental to non-environmental crime convictions, environmental crimes lead to overall less severe sanctioning outcomes. This question was informed by prior theory and research on formal social control responses targeted at environmental offending and, separately, prior theory and research that informs efforts to identify disparities that emerge in criminal sentencing systems (e.g., Steffensmeier et al. 1998). Findings provide general support for our hypothesis and, indirectly, for focal concerns and other attributions perspectives that emphasize the salience of stereotypes and perceptions held by court actors for sentencing decisions. Specifically, four main conclusions emerged from these analyses.

First, results support the argument that the state court system under examination treated environmental crimes more leniently than exactly matched non-environmental crimes. This conclusion is based on the results of a rigorous precision matching approach that incorporated a diverse range of detailed and relevant covariates measuring legal and extralegal factors that could act as sources of selection bias. The matching design created theoretically comparable environmental and non-environmental offender groups who committed statute violations of similar severity. Comparative results and multinomial logistic regression analyses using these matched samples revealed that environmental offenses were overall and substantially more likely to receive community-based sanctions (i.e., probation) than incarceration-based sanctions (i.e., jail, prison), compared to non-environmental offender convictions. This disparity emerged despite the fact that matched treatment and control groups were precisely the same on legal and extralegal dimensions, including offense severity scores. By extension, this suggests that some other mechanism that was not included in the matching algorithm, such as court actors' perceptions that environmental crimes are less serious or harmful, affect environmental crime sanctioning outcomes.

Second, these results are nuanced, differing in important ways based on the type of environmental crime under consideration. Specifically, we found that although wildlife and animal offenders were generally more likely to receive probation than be sentenced to jail or prison, wildlife and animal offenders were more likely to receive a prison sentence than their matched, non-environmental offender counterparts. They were not, however, more likely to receive a jail sentence than non-environmental offenders. This specific pattern is the opposite of that identified for ecological offenders, and it is in stark contrast to our original hypothesis.

What would explain the increased incarceration likelihood for wildlife and animal offenders? Although it goes beyond the scope of the analyses, it is possible that, in some instances, crimes against animals are generally perceived by court actors to be more violent than comparable drug and property offenders. At the same time, it may be easier to view crimes against animals as having tangible or direct victims, unlike low-level drug offenders and unlike ecological crimes where the victim is in actuality a tract of land or a larger ecosystem. More practically, animal abuse has been regularly correlated with violence and psychopathy, and is consistently included as a risk factor in psychiatric risk assessment tools utilized by courts and judges as an indicator of future violence (Merz-Perez and Heide 2003; Merz-Perez et al. 2001). As such, prosecutors and judges may in some ways

be trained to perceive that this group of felony offenders presents heightened risks or is a greater community threat, leading to more severe or restrictive punishment outcomes. At the same time, the precision matching did not match environmental offenders to violent street crime offenders. Thus, although wildlife/animal crimes may be perceived as more serious than some drug and property crimes, Florida sentencing guidelines are not treating such crimes as equivalent to violent offenses with human victims. Ideally, future studies can work to assess these and other potential explanations of disparities by, for example, examining how environmental crimes of different types are perceived by court actors and society members.

Third, this study identified a range of broader, descriptive findings that reveal unique information about environmental felony convictions, including the fact that felony convictions for environmental crimes are quite rare. Specifically, environmental crimes represent on average less than 1 % of all felony convictions processed through Florida's state courts annually. This finding also illuminates a limitation of this and other studies assessing formal sanctions for environmental crimes. That is, there is no clear way to assess the representativeness of environmental crime felony convictions to actual environmental crimes committed. Thus, we have no evident basis to assess whether the environmental felony offenses and offenders processed in state courts are representative of the larger body of environmental crimes that are committed in society. With that said, strictly for the purposes of uncovering patterns in actual sanctioning practices (i.e., when an environmental felony charge *does* come before the courts), the study benefits from using this large, comprehensive dataset of state sentencing events.

Fourth, although the analyses do not represent a direct test of focal concerns theory, the findings of this paper provide general support for and a unique extension of focal concerns and other attributions perspectives of criminal sentencing (e.g., Steffensmeier et al. 1998). The focal concerns perspective provides a plausible explanation of our findings, which indicated that state courts do not punish some environmental offenders as harshly as they do conventional offender types, all else equal. In accordance with the theory, the harms of environmental crimes are not well publicized and are likely to be largely unknown to citizens, which include court judges and state prosecutors; especially in comparison to drug and property crimes, which receive substantially more media and law enforcement attention (Brisman 2013; Lynch 2013). In turn, judges and prosecutors may perceive that environmental crimes or environmental offenders are less threatening or less dangerous, and so be less inclined to assign prison sentences.

Our analyses, however, add to the list of studies that utilize the focal concerns framework, but due to data restrictions, are unable to directly tap into perceptions of prosecutors or judges or otherwise measure the theorized focal concerns mechanisms. Future research that can measure the core focal concerns dimensions and test directly how court actors' perceptions influence decision making related to sanctioning environmental offenders is needed. For example, ancillary analyses indicated that harsher sanction decisions for environmental offenders are more heavily influenced by an offender's history of prior supervision violations than are such decisions for non-environmental offenders. This indirectly assesses the factors that may influence sentencing outcomes and, in turn, lead to disparities. Going forward, studies that directly measure, via surveys or interviews, how court actors perceive environmental offenders and the risks they pose to community members (or do not pose) would more directly assess these mechanisms, which we could only speculate about here.

Our matching analysis also sheds light on the types of non-environmental offenders who compare most similarly to typical environmental offenders in Florida, at least based on the

formal sentencing guidelines dimensions used in Florida and the other matching covariates that we included in our algorithm. Based on our matching, environmental offenders compare most similarly to low-level property and drug offenders. This comparison is relevant for policy because it provides an important point of reference and a useful counterfactual for understanding how environmental offenders are treated. In other words, the state, arguably, "views" the typical environmental offender most similarly to a low-level drug or property offender. Yet, our analyses indicate that environmental offenders received more lenient punishments than those matched counterparts. This finding raises critical questions about how state and court systems (and sentencing commissions) perceive environmental crimes compared to various non-environmental crimes as well as questions about earlier decision points that may be important areas to study. For example, apart from court decisions about sanctions, scholars should also consider research that explores the factors that influence the development of sentencing guidelines and state sentencing commission decisions. In theory, perceptions of relative harms and costs of environmental crimes play a critical role in those score assignments—for example, sentencing commissions may well underestimate the costs and harms of environmental crimes and thus assign relatively low severity scores—but our data did not allow us to tap into that earlier decision point.

Our analysis is also limited in at least two other notable ways. First, the analysis focuses on a single state with a particular sentencing procedure. The results may not be generalizable to other states, especially those that use substantially different sentencing processes. Findings from other states might also reveal differences in sanctioning trends based on the types of environmental crimes that flow through a given state's courts. Second, there are likely other types of control or matching variables that should be accounted for but that we could not access in Florida. For example, as noted by one of the anonymous reviewers, prior scholarship suggests that establishing intent in environmental criminal cases is a thorny issue in part because although the bar to establish intent is arguably lower in environmental cases, prosecutors face challenges actually establishing that a given, alleged environmental offender deliberately sought to cause, for example, ecological harm. In such instances, prosecutors and courts may be unwilling to impose severe punishments (see, generally, Brickey 1996; O'Hear 2004; Uhlmann 2014). We could not measure whether traditional intent was established in a given case with our data, but including such an indicator in the matching algorithm may elicit different results. Going forward, research that systematically examines the relationship between establishing intent and trends in sanctioning across different crime types should help shed light on this issue.

Future scholarship can build on this study and substantially advance research on environmental crime and punishment through other avenues, including assessing more directly the factors that influence citizens' and court actors' perceptions about the culpability, danger, and risk posed by environmental offenders, and whether these perceptions actually impact sentencing decisions (e.g., Huebner and Bynum 2006). More broadly, what are the perceived costs and harms of environmental crimes? How do individuals feel environmental offenders should be punished? And how might these perceptions of punishments change when citizens are informed of the actual costs and harms that result from environmental crimes? Last, what are the practical impacts of punishments for future rates of environmental crimes? Results of studies that work to answer these questions would be informative in their own right, and could be used to better identify incongruences between actual court sentencing practices, social perceptions, and the effects of criminal sanctions for environmental crimes on future offending.

Acknowledgments We very much appreciate the thoughtful comments and suggestions of Robert Apel as well as the anonymous reviewers. We would also like to thank the Florida Department of Corrections (FDC) and the Florida Department of Law Enforcement (FDLE) for providing the data for this study. The views expressed in this paper are those of the authors and do not necessarily reflect those of FDC or FDLE.

Appendix 1

Sanction outcomes for ecological versus wildlife and animal crimes, pre- and post-matching

	Pre-matching		Post-matching	
	Ecological (%, n = 1746)	Wildlife and animal (%, n = 1415)	Ecological (%, n = 300)	Wildlife and animal (%, n = 289)
Other sanction	2.41	2.33	2.67	1.18
Probation	70.96	68.13	85.67	87.23
Community control	2.69	5.65	1.00	1.03
Jail	21.53	14.77	10.67	7.22
Prison	2.41	9.12	0.00**	3.33
Total	100	100	100	100

* $p < .05$; ** $p < .01$, *** $p < .001$ for difference of means test between matched ecological and wildlife sentencing events. Wildlife and animal crimes (treatment) were matched to ecological crimes (control)

Appendix 2

Logistic regression of matching variables on prison sentence using matched green and non-green crime samples (prison = 1, non-prison = 0)

	Green Crime (Ecological and wildlife/animal)		Non-green crime	
	b	S.E.	b	S.E.
Male	0.211	0.044	0.574***	0.052
Age	−0.020*,†	0.010	0.006***,†	0.001
Black	0.051	0.236	0.050**	0.019
Latino	0.551	0.373	−0.021	0.062
Severity points	0.136***,†	0.019	0.027***,†	0.002
Prior violations	1.688***,†	0.208	1.245***,†	0.019
Misdemeanors	0.180**	0.059	0.111***	0.005
Felonies	0.638***	0.064	0.657***	0.005
Trial	1.180	0.619	1.334***	0.062
Judicial circuit dummy variables	–	–	–	–
Sentencing year dummy variables	–	–	–	–
Intercept	−6.134***	0.809	−4.842***	0.072
n	3056		266,034	
Log likelihood	−411.773		−54,392.093	

continued

	Green Crime (Ecological and wildlife/animal)		Non-green crime	
	b	S.E.	b	S.E.
Pseudo R-squared	0.312		0.224	

* $p < .05$, ** $p < .01$; *** $p < .001$; † $p < .05$ for difference of coefficient test using the "suest" command in Stata. "White" excluded as a reference category. "Victim injury" was also excluded because it is rare for green crimes to have a victim injury (n = 6) and it perfectly predicted the outcome in the matched sample of green offenders. Ancillary analyses where victim injury was included for the non-environmental crime sample revealed substantively similar coefficient estimates for the other covariates. Judicial circuit and sentencing year dummy variables were also included in the model and coefficients were excluded here to conserve space

References

Albonetti CA (1997) Sentencing under the federal sentencing guidelines: effects of defendant characteristics, guilty pleas, and departures on sentencing outcomes for drug offenses, 1991–1992. Law Soc Rev 31:789–822

Allan RH (1987) Criminal sanctions under federal and state environmental statutes. Ecol Law Q 14:117–179

Almer C, Goeschl T (2010) Environmental crime and punishment: empirical evidence from the German Penal Code. Land Econ 86:707–726

Atlas M (2001) Rush to judgement: an empirical analysis of environmental equity in U.S. Environmental Protection Agency Enforcement Actions. Law Soc Rev 35:633–682

Bales WD, Piquero AR (2012a) Assessing the impact of imprisonment on recidivism. J Exp Criminol 8:71–101

Bales WD, Piquero AR (2012b) Racial/ethnic differentials in sentencing to incarceration. Justice Q 29:742–773

Barnosky AD, Matzke N, Tomiya S, Wogan GOU, Swartz B, Quental TB, Marshall C, McGuire JL, Lindsey EL, Maguire KC, Mersey B, Ferrer EA (2011) Has the earth's sixth mass extinction already arrived? Nature 471(7336):51–57

Beirne P, South Nigel (eds) (2013) Issues in green criminology. Routledge, New York

Billiet CM, Rousseau S (2014) How real is the threat of imprisonment for environmental crime? Eur J Law Econ 37:183–198

Billiet CM, Blondiau T, Rousseau S (2014) Punishing environmental crimes: an empirical study from lower courts to the court of appeal. Regul Gov 8:472–496

Blackwell M, Iacus S, King G, Porro G (2009) CEM: coarsened exact matching in stata. Stata J 9:524–546

Brickey KF (1996) Environmental crime at the crossroads: the intersection of environmental and criminal law theory. Tulane Law Rev 71:487–525

Brickey KF (2001) Charging practices in hazardous waste crime prosecutions. Ohio State Law J 62:1077–1125

Brisman A (2008) Crime-environment relationships and environmental justice. Seattle J Soc Justice 6:727–907

Brisman A (2013) The violence of silence: some reflections on access to information, public participation in decision-making, and access to justice in matters concerning the environment. Crime Law Soc Change 59:291–303

Burns RG, Lynch MJ (2004) Environmental crime: a sourcebook. LFB Publishers, New York

Chiricos TG, Waldo GP (1975) Socioeconomic status and criminal sentencing: an empirical assessment of a conflict proposition. Am Sociol Rev 40:753–772

Clarke SH, Koch GG (1976) The influence of income and other factors on whether criminal defendants go to prison. Law Soc Rev 11:57–92

Clausen R, Clark B (2005) The metabolic rift and marine ecology: an analysis of the oceanic crisis within capitalist production. Organ Environ 18(4):422–444

Clausen R, York R (2008) Global biodiversity decline of marine and freshwater fish: a cross-national analysis of economic, demographic, and ecological influences. Soc Sci Res 37(4):1310–1320

Cohen MA (1992) Environmental crime and punishment: legal/economic theory and empirical evidence on enforcement of federal environmental statutes. J Criminal Law Criminol 82:1054–1108
Cook TD, Shadish WR, Wong VC (2008) Three conditions under which experiments and observational studies produce comparable causal estimates: new findings from within-study comparisons. J Policy Anal Manag 27:724–750
Crow MS, Shelley TC, Stretesky PB (2013) Camouflage-collar crime: an examination of wildlife crime and characteristics of offenders in Florida. Deviant Behav 34:635–652
Doerner JK, Demuth S (2014) Gender and sentencing in the federal courts: are women treated more leniently? Criminal Justice Policy Rev 25:242–269
Eliason SL (2008) Wildlife crime: conservation officers' perceptions of elusive poachers. Deviant Behav 29:111–128
Florida Department of Corrections & Office of the State Courts Administrator (2012) Florida criminal punishment code. Florida Department of Corrections & Office of the State Courts Administrator, Tallahassee
Forsyth C, Marckese TA (1993) Folk outlaws: vocabularies of motives. Int Rev Modern Soc 23:17–31
Frankel Emil (1940) The offender and the court: a statistical analysis of the sentencing of delinquents. Am Inst Criminal Law Criminol 31:448–456
Franklin TW (2015) Race and ethnicity effects in federal sentencing: a propensity score analysis. Justice Q 32:653–679
Global Initiative Against Transnational Organized Crime (2014) The global response to transnational organized environmental crime: key messages and core recommendations. Global Initiative Against Transnational Organized Crime, Geneva
Greife M, Stretesky PB, Shelley TO, Pogrebin M (2015) Corporate environmental crime and environmental justice. Criminal Justice Policy Rev. doi:10.1177/0887403415576742
Guo S, Fraser MW (2010) Propensity score analysis: statistical methods and applications. Sage Publications, Thousand Oaks
Hagan J (1975) Law, order, and sentencing: a study of attitude in action. Sociometry 38:374–384
Hauserman J (2002) Boca grande gator hunter is accused of poaching. St. Petersburg Times. p. 1B
Heckman JJ, Ichimura H, Todd PE (1997) Matching as an econometric evaluation estimator: evidence from evaluating a job training programme. Rev Econ Stud 64:605–654
Hoffmann JP (2004) Social and environmental influences on endangered species: a cross-national study. Sociol Perspect 47(1):79–107
Huebner BM, Bynum TS (2006) An analysis of parole decision making using a sample of sex offenders: a focal concerns perspective. Criminology 44(4):961–991
Jarrell ML, Lynch MJ, Stretesky PB (2013) Green criminology and green victimization. In: Arrigo B, Bersot H (eds) The Routledge handbook of international crime and justice studies. Routledge, London, pp 423–444
Johnson BD, DiPietro SM (2012) The power of diversion: intermediate sanctions and sentencing disparity under presumptive guidelines. Criminology 50:811–850
Johnson BD, Kurlychek MC (2012) Transferred juveniles in the era of sentencing guidelines: examining judicial departures for juvenile offenders in adult criminal court. Criminology 50:525–564
Kahneman D (2011) Thinking, fast and slow. Farrar, Straus, and Giroux, New York
Kautt P, Spohn C (2002) Crack-ing down on black drug offenders? testing for interactions among offenders' race, drug type, and sentencing strategy in federal drug sentences. Justice Q 19:1–35
Kramer JH, Ulmer JT (2009) Sentencing guidelines: lessons from Pennsylvania. Lynne Rienner, Boulder
Kurlychek MC, Johnson BD (2010) Juvenility and punishment: sentencing juveniles in adult criminal court. Criminology 48:725–758
Kutateladze BL, Andiloro NR, Johnson BD, Spohn CC (2014) Cumulative disadvantage: examining racial and ethnic disparity in prosecution and sentencing. Criminology 52:514–551
Labaton S (1989) Does an assault on nature make exxon a criminal? New York Times. Apr 23, 1989, p. D1
Lavelle M, Coyle M (1992) Unequal protection: the racial divide on environmental law. Natl Law J 15:S1–S12
Lazarus RJ (1996) Mens rea in environmental criminal law: reading supreme court tea leaves. Fordham Environ Law J 7(3):861–880
Light MT (2014) The new face of legal inequality: noncitizens and the long-term trends in sentencing disparities across US District Courts, 1992–2009. Law Soc Rev 48:447–478
Lynch MJ (2013) Reflecting on green criminology and its boundaries: comparing environmental and criminal victimization and considering crime from an eco-city perspective. In: South N, Brisman's A (eds) The Routledge international handbook of green criminology. Routledge, London, pp 43–57

Lynch MJ, Stretesky PB (2003) The meaning of green: contrasting criminological perspectives. Theor Criminol 7:217–238
Lynch MJ, Stretesky PB, Burns RG (2004) Slippery business: race, class, and legal determinants of penalties against petroleum refineries. Criminology 34:421–440
Lynch MJ, Long MA, Barrett KL, Stretesky PB (2013) Is it a crime to produce ecological disorganization? Why green criminology and political economy matter in the analysis of global ecological harms. Br J Criminol 53:997–1016
Lynch MJ, Burns RG, Stretesky PB (2014) Environmental law, crime, and justice. LFB Scholarly, El Paso
McMurry RI, Ramsey SD (1986) Environmental crime: the use of criminal sanctions in enforcing environmental laws. Loval Los Angel Law Rev 19:1133–1170
Merz-Perez L, Heide KM (2003) Animal cruelty: Pathway to violence against people. Rowman Altamira, Lanham
Merz-Perez L, Heide KM, Silverman Ira J (2001) Childhood cruelty to animals and subsequent violence against humans. Int J Offender Ther Comp Criminol 45(5):556–573
Nagin DS, Cullen FT, Jonson CL (2009) Imprisonment and reoffending. Crime Justice 38:115–200
O'Hear MM (2004) Sentencing the green-collar offender: punishment, culpability, and environmental crime. J Criminal Law Criminol 95:133–276
Ogus A, Abbott C (2002) Sanctions for pollutions: do we have the right regime? J Environ Law 14:283–298
Ringquist EJ (1998) A question of justice: equity in environmental litigation, 1974–1991. J Politics 60:1148–1165
Rockstrom J, Steffen W, Noone K, Asa Perrson F, Chapin S, Lambin E, Lenton TM, Scheffer M, Folke C, Schellnhuber HJ, Nykvst B, de Wit CA, Hughes T, van der Leeuw S, Rodhe H, Sorlin S, Snyder PK, Costanza R, Svedin U, Falekmark M, Karlberg L, Corell RW, Fabry VJ, Hanson J, Walker B, Liverman D, Richardson K, Crutzen P, Foley J (2009) Planetary boundaries: exploring the safe operating space for humanity. Ecol Soc 14(2):32–47
Romley JA, Hackbarth A, Goldman DP (2010) The impact of air quality on hospital spending. RAND Corporation, Santa Monica, CA
Sanderson K, Lopez J (2015) Reward Increased to $15,000 for information about killing of endangered florida panther in collier county. Press Release, Center for Biological Diversity. Center for Biological Diversity. May 7
Savolainen J, Hughes LA, Hurtig TM, Ebeling H, Taanila AM (2013) Does vocational schooling facilitate criminal offending? A study of educational tracking in finland. Eur J Criminol 10:606–622
Shelley TC, Chiricos T, Gertz M (2011) What about the environment? Assessing the perceived seriousness of environmental crime. Int J Comp Appl Criminal Justice 35(4):307–325
Simon D (2000) Corporate environmental crimes and social inequality: new directions for environmental justice research. Am Behav Sci 43:633–645
Situ Y, Emmons D (2000) Environmental crime: the criminal justice system's role in protecting the environment. Sage Publications, Thousand Oaks
South N (1998) A green field for criminology? a proposal for a perspective. Theor Criminol 2:211–233
South N, Brisman A, Beirne P (2013) A guide to green criminology. In: South N, Brisman's A (eds) The Routledge international handbook of green criminology. Routledge, London, pp 27–42
Spohn C, Holleran D (2000) The imprisonment penalty paid by young, unemployed, black and hispanic male offenders. Criminology 38:281–306
Stafford SL (2002) The effect of punishment on firm compliance with hazardous waste regulations. J Environ Econ Manag 44:209–308
Steffen W, Crutzen PJ, McNeill JR (2007) The anthropocene: are humans now overwhelming the great forces of nature? Ambio A J Hum Environ 36(8):614–621
Steffen W, Grinevald J, Crutzen Paul J, McNeill John P (2011) The anthropocene: conceptual and historical perspectives. Philos Trans R Soc A Math Phys Eng Sci 369:842–867
Steffensmeier DJ (1980) Assessing the impact of the women's movement on sex-based differences in the handling of adult criminal defendants. Crime Delinq 26:344–357
Steffensmeier D, Demuth S (2000) Ethnicity and sentencing outcomes in U.S. Federal Courts: who is punished more harshly? Am Sociol Rev 65:705–729
Steffensmeier D, Ulmer J, Kramer J (1998) Interaction of race, gender, and age in criminal sentencing: the punishment cost of being young, black, and male. Criminology 36:763–797
Stennett D (2012) Poached animals' meat sold—18 Jailed. The Orlando Sentinel. November 15, p. 2B
Stepzinski T (2013) Foreclosures add to illegal dumping woes—clay detectives find increasing debris from house 'clean-outs.' The Florida Times Union. August 25, p. 1B
Stretesky PB (2006) Corporate self-policing and the environment. Criminology 44:671–708

Stretesky PB, Long MA, Lynch MJ (2013) Does environmental enforcement slow the treadmill of production? The relationship between large monetary penalties, ecological disorganization, and toxic releases within offending corporations. J Crime Justice 36:235–249

Uhlmann DM (2014) Prosecutorial discretion and environmental crime. Harvard Environ Law Rev 38:159–216

United Nations Environmental Programme (2014) UNEP year book, 2014

Walters R, Westerhuis DS (2013) Green crime and the role of environmental courts. Crime Law Soc Change 59:279–290

White R (ed) (2013) Global environmental harm: criminological perspectives. Routledge, New York

World Bank (2007) Costs of pollution in china: economic estimates of physical damage. Report no. 39236. World Bank, Washington, DC