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# CoyoteBytes.org – A Website to Inform Urban Coyote Management

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**ABSTRACT:** Conflicts between urban coyotes and humans have increased in recent years, particularly in the West. These include aggression and attacks on children, adults, and on pets; and damage to drip irrigation systems, garden crops, and other resources. News reports and our contact with agencies have informed us of more than 110 incidents in California alone, most within the past decade, in which humans were bitten by coyotes. However, few data are available on incidents of pet loss or other human-coyote conflicts in urban habitats. We suspect many conflicts occur because of human behaviors that results in coyote habituation; we hypothesize that with informed management, most are preventable. We have developed a web site, <http://www.CoyoteBytes.org>, as a tool to provide science-based management recommendations to homeowners and municipal officials to reduce coyote conflicts in urban / suburban areas. In addition to providing information, the website allows individuals to voluntarily upload photos and video of urban coyotes, and to submit first-hand reports describing conflicts and encounters. The web site contains an incident map, an Internet-enabled Geographic Information Systems (webGIS) tool, allowing coyote incidents to be displayed via a dynamic mapping interface by type of incident and by progress through time. The website became functional in September 2007 and is being pilot-tested in San Diego, Orange, and Los Angeles counties, California. The information being collected concerning coyote encounters and incidents should, over time, provide a means for a more complete analysis of this problem, thereby improving our management recommendations. A better factual understanding of the dimensions of the problem, as well as impacts of various management strategies currently in use, should help reduce some of the polarized atmosphere surrounding cities' and counties' attempts to find appropriate solutions to these conflicts.

**KEY WORDS:** *Canis latrans*, coyote, coyote attacks, coyote-human conflict, Internet, predator management, suburban environment, urban environment, website

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## INTRODUCTION AND PURPOSE

The phenomenon of coyote (*Canis latrans*) attacks on humans began to occur primarily in suburban southern California during the 1970s (Howell 1982, Baker and Timm 1998, Timm et al. 2004). An increasing frequency of such attacks was noted, particularly in Los Angeles, Orange, and San Diego Counties, California, during the 1980s and 1990s. By the mid-1990s such incidents had been reported from a number of other states and several Canadian provinces, with increasing frequency, while it also was apparent that coyote attacks on pets in suburbia was becoming a major problem throughout the West (Timm 2007, Timm and Baker 2007).

The creation of the web site Coyotebytes.org (<http://www.CoyoteBytes.org>) was in response to recognition of two needs: 1) A need for educational materials, on management strategies for urban and suburban coyote (*Canis latrans*) conflicts within California, to be readily available to homeowners, land managers, city and regional decision-makers, and others; and 2) A need to capture better, more complete information on coyote-human conflicts occurring in urban and suburban environments within California.

The CoyoteBytes web site was conceived in late 2006 and was launched in mid-September 2007. This web site contains science-based management recommendations and research information focused on the issue of human-coyote conflicts in California (specifically, the

problem of coyote attacks on humans in southern California). Additionally, it provides a means for individuals to submit first-hand reports on coyote incidents and coyote damage that has occurred. Initially, such reports are being collected from 3 counties in Southern California: Los Angeles, Orange, and San Diego Counties, where the majority of human safety incidents have been reported over the past 30 years. We anticipate eventual expansion of the geographic area covered to include all of California.

One of our goals is to provide factual information, based on the best available science and management experience, concerning the management of human-coyote conflicts in urban and suburban environments. We were encouraged by successful past efforts in cities and counties in Southern California that made concerted efforts to inform residents about coyotes, coyote behavior, and the actions that homeowners and neighborhoods can take to prevent coyotes from becoming so habituated to humans as to become a health and safety risk. For example, the city of Glendale, California, in the late 1980s and early 1990s, achieved success with the educational aspects of a program to teach residents how to reduce conflicts with coyotes (Baker and Timm 1998). Concurrently or subsequently, many cities as well as other entities (e.g., the California Department of Fish & Game, regional park agencies, animal welfare organizations) developed brochures, posters, and other published



Figure 1. Home page of website [www.CoyoteBytes.org](http://www.CoyoteBytes.org).

information on ways to make yards and other landscaped environments less attractive to coyotes, reducing the chance they would be drawn into close association with humans. We seek to make such information more readily available to a wide audience.

Secondarily, we are seeking to use this website as a tool to collect current, more complete information about ongoing incidents of human-coyote conflict. No single agency or organization has obtained or compiled such data over an entire region. Previous publications detailing known incidents of coyote attacks on humans in California have, of necessity, relied on newspaper articles, reports from agencies or organizations, and word-of-mouth reports of such incidents (Baker and Timm 1998, Timm et al. 2004). Such sources are notably incomplete and inconsistent in the types of information reported. We are also aware that these sources provide only a subset (how large is unknown) of all such incidents that have occurred within the state. We believe that a more complete, more detailed set of data concerning coyote-human conflicts over time will better inform management recommendations, as well as provide a better basis on which to discern whether such problems are growing and spreading.

## WEB SITE'S DESIGN

### Home Page

The website's home page provides a brief overview of the site's features (Figure 1). It notes that website users can do the following: find information about urban coyotes; report a coyote encounter or incident; view a map of coyote incidents; or find links to more information about coyotes.

### About Us

The web page "About Us" lists the website's authors and affiliations. On this page, as well as on the logos on all of the site's main pages, clicking on a link or logo will allow the user to jump to web pages associated with the

authors or the units with which they are affiliated within the University of California (UC) or other agencies.

### Coyote Information

The "Coyote Information" page provides viewable and downloadable publications dealing with the issue of conflicts caused by urban and suburban coyotes. Central to this page is the UC-IPM Pest Note publication "Coyotes" (Timm et al. 2007), which was published in March 2007 and is intended to be an extension-type guide for general audiences, aimed specifically at residents, landowners, land managers, and civic decision-makers in urban and suburban environments of California. While providing general information on the biology and behavior of coyotes in such environments, it also provides management recommendations that can be of significant value in preventing coyote-human conflicts in cities and towns. As with most of the publications viewable on this page, it is available either in HTML format or can be downloaded and/or printed in PDF format.

Other publications included for viewing or downloading are the California Department of Fish and Game's "Keep Me Wild" poster and brochure about coyotes; the United States Department of Agriculture Wildlife Services' 2-page fact sheet "Urban and Suburban Coyotes" (USDA 2002); and the chapter "Coyotes" from the Prevention and Control of Wildlife Damage (Green et al. 1994). The collection of 24 papers presented during the Urban Coyote Symposium, held in April 2007 during the 12<sup>th</sup> Wildlife Damage Management Conference, in Corpus Christi, TX, became available with the publication of the Proceedings from that Conference, and these papers were added to our web site in June 2008 (see Timm 2007).

Also listed are a number of general publications about coyotes that will be of interest to those wanting to learn more about this species' biology, behavior, and natural history. These publications, which are typically available from most city libraries, either in their collec-

tions or through interlibrary loan, will greatly enhance the average person's understanding of the coyote as a species. It has been documented that people's willingness to tolerate some level of nuisance or damage from wildlife is generally increased as the individual's understanding of the species grows (Miller 1995, Jones et al. 1998). Thus, one of our goals in including these references is to help urban and suburban residents develop a better appreciation for, and perhaps a greater tolerance of, coyotes in urban and suburban settings. We also think that this increased knowledge will enhance residents' understanding of the need to conduct preventive measures to keep coyotes from becoming too habituated to humans and residential resources.

### **Coyote Gallery**

This page is a gallery of digital photos and video clips of urban and suburban coyotes. Web page users can upload their own photos or brief videos of coyotes in suburbia. Persons submitting photos or video clips can choose to credit the photographer by name or to remain anonymous. We request the photo location be identified. After submission, photos and videos are reviewed by the website manager before being added to the gallery, to assure that no inappropriate photos are posted.

### **Report A Coyote Encounter**

This page is the entry point for report forms that allow individuals to provide information on first-hand encounters or incidents involving people and coyotes or their pets or hobby animals. The purpose of this section is to attempt to gather more complete information about the distribution of coyote incidents through time within California (during 2007, limited to the counties of Los Angeles, Orange, and San Diego). We ask about selected details of such incidents or encounters, so that we can better evaluate and understand the factors that cause such conflicts, with the goal of developing better management guidelines to prevent negative coyote-human interactions. We divide encounters or incidents into 6 broad categories (see Figure 2):

- 1) Incidents involving coyote aggression or attacks on humans, including cases in which coyotes have come within 20 feet or less of humans.
- 2) Incidents involving coyote attacks on dogs or cats, including those attacks involving harassment of pets, as well as those resulting in the injury or death of such pets.
- 3) Incidents involving coyote attacks on hobby animals such as rabbits, poultry, goats, sheep, etc. that are present in suburban settings, including ranchettes and semi-rural properties adjacent to suburban environments.
- 4) Incidents of disappearance of dogs, cats, or hobby animals, for which the respondent has some evidence that the animal was preyed upon by coyotes.
- 5) Incidents in which coyotes caused damage to resources within the urban or suburban environment; this might involve, for example, coyotes chewing plastic drip irrigation systems, or coyotes eating fruits, melons, or other garden produce.
- 6) Incidents simply involving sightings of coyotes in

urban and suburban environments. Increased sightings of coyotes in such environments, particularly during daylight hours, can be considered a precursor to more serious nuisance problems and even of serious conflicts, up to and including attacks on pets or on people (Baker and Timm 1998).

### **Incident Map**

The incident map is an Internet-enabled Geographic Information Systems (webGIS) tool that allows for coyote incidents to be displayed and viewed via a dynamic mapping interface. WebGIS tools have been used many times in the past for increasing public awareness and education, for improving monitoring and management of data for ecological studies, and for harnessing the resources of the general public for data collection via the Internet (Kearns et al. 2003, Kelly and Tuxen 2003). The CoyoteBytes incident map enables interested parties, including management personnel and concerned community members, to report on coyote encounters, ultimately allowing for better understanding of coyote habitat in wildland-urban interface areas. Map tools include features that allow the user to zoom in on specific geographic areas; to view, by type of incident and by progress through time, the locations of coyote incidents reported; and to print maps generated by use of the available tools.

The website was built using ArcIMS (Internet Mapping Services) software, version 9.2 (Environmental Systems Research Institute – ESRI, Redlands, CA). The software enables maps and spatial datasets to be accessible online at all times through any Internet browser. As a result, no special GIS software is needed, enabling those that are less GIS-savvy to access and interact with the coyote data. The CoyoteBytes incident map is integrated with the report form, as well as the rest of the website, and will depict those coyote encounters and images/videos that are submitted via the website, using submitted location information. In addition to submitted coyote encounters and images, numerous datasets are available for viewing and customizing the incident map, including county, park, and urban area boundaries, river, highway, and street networks, and elevation and topographical maps for easy location reference. Currently, the geographic area is limited to Los Angeles, Orange, and San Diego Counties.

An example of a map, generated from incident reports submitted by members of the public that shows locations of coyotes sightings and other incidents, is found in Figure 3.

### **Links**

This web page provides links to other web sites that contain information or resources concerning urban and suburban coyotes. It is currently subdivided into information general to California, and information pertinent to the three pilot counties.

### **CoyoteBytes Promotional Tools**

This page displays types of materials available to promote the use of this web site. Currently, these include



business cards and card holders, and posters in two sizes. An order blank for these materials is provided, so that individuals, agencies, businesses, and others who wish to assist in making known the availability of this website can order these items. Additionally, this page provides access to a general news release describing the website project, as well as a short news article about the website that is suitable for use in newsletters.

### Website Promotion and Advertising

Initially, availability of the website was publicized through focused efforts in Los Angeles, Orange, and San Diego Counties. We utilized contacts available through UC Cooperative Extension offices in these counties, the counties' Agricultural Commissioner offices, and other organizations and entities in the pilot area. The Office of News and Information Outreach, Division of Agriculture and Natural Resources, within the University of California issued a news release about the website in late September 2007, targeting it to science and nature reporters in southern California. Additionally, we made in-person visits to a majority of 24-hour emergency veterinary clinics in each of these three counties, providing them with business cards and posters publicizing the web site.

### RESULTS

By mid-January 2008 (i.e., after the site had been available to the public for approximately 4 months), it had received over 3,400 visits. The visibility of this site, likely influencing the high number of visits it received soon after its launch, was assisted by a news article published in the Los Angeles Times on October 4, 2007 that prominently mentioning the web site (Yoshihara 2007). By this point in time, residents of the 3-county pilot area (Los Angeles, Orange, and San Diego Counties) had submitted 275 reports of coyote sightings or incidents, of which some 64% were simply coyote sightings, while 28% were reported incidents of coyote attacks on dogs or cats (Table 1). In those incidents where the report specified which type of pet was attacked, 57% involved dogs, while 43% involved attacks on cats. Of the 47 dog / cat attack incidents where the fate of the pet was reported, a high incidence of mortality was noted: 19 of 27 (70%) of attacks on dog were fatal, while 17 of 20 (85%) of attacks on cats were fatal.

These data likely are not representative of all coyote attacks on pets that occur in southern California, or even in the 3-county area; it is probably human nature for people to be more highly motivated to report more serious incidents that have occurred, as opposed to minor incidents of attack or harassment where pets are simply accosted, chased, or otherwise threatened. In many areas of southern California, local, county, or state agencies that have responsibility for animal control or wildlife management do not have staffing or resources to respond to incidents of attacks on pets, and in many instances when citizens call in with such complaints, they are informed that the agency will only respond to incidents in which human health or safety are threatened. In some situations, this may lead homeowners to exaggerate the

**Table 1. Number of voluntary reports of coyote sightings or incidents reported to CoyoteBytes.org during Sept. 15, 2007 to Jan. 20, 2008 (reports are unverified).**

Category	Number of Reports
Sightings	177
Dog / Cat attacks	76
Animal disappearance	7
Human safety	6
Hobby animal	5
Other	4
<b>Total</b>	<b>275</b>

seriousness of such incidents in an effort to obtain on-site assistance from a given governmental agency (G. Randall, Animal Services, City of Los Angeles, pers. commun.).

### User Comments

Web site visitors who have made use of the site's feature that allows individuals to submit comments or suggestions have provided a variety of responses, both positive and negative. For example, one individual wrote, "*Thank you for your work. My neighbors and I appreciate it very much. There are many coyotes in my neighborhood... Did you read about the young girl attacked by a coyote in Chino, CA last week? My neighborhood is full of little kids, and I fear that sooner or later a kid will be attacked*" (10/14/07 comment). Contrast that with the message sent by another website visitor: "*I just read the LA Times article about your website. It failed to mention any benefit the coyote provides to the ecological community... for example keeping the rat population in check without the use of poisons, or carrion management. Coyotes are an important part of California's natural habitat and should not be presented to the public as a problem to be eliminated like rats or cockroaches. Your approach, at least as presented in the LA Times is myopic, one sided and irresponsible*" (10/4/07 comment).

### DISCUSSION

The primary objective of this website has been to provide the public and decision-makers at both the local and regional level with scientifically sound, current information on urban coyotes and ways to prevent or remedy conflicts they cause with humans in urban and suburban environments. From the number of website visits, as well as the comments received from website visitors to date, we believe this effort has succeeded in filling this need, particularly in the 3 pilot counties of southern California where the problem has been most pronounced.

The secondary objective of collecting new information on human-coyote encounters and coyote incidents remains a work in progress. We wish to expand the website's data collection capabilities beyond the pilot 3-county area at some time in the near future. We anticipate that at some point in the future, the information we are obtaining from voluntary reports via this web site

can, with the use of GIS technologies, be used to evaluate such incidents according to a variety of criteria or common factors, including...

- by type of incident / damage
- by habitat or proximity to certain resources or geographical features
- by city or county (which may employ differing coyote management strategies)
- through time
- in space (to show range expansion of coyotes, or locations in which bold behaviors in coyotes are beginning to develop).

However, it will take time and effort to evaluate the raw reports of sighting and incidents, so as to eliminate duplicate reports (where more than one resident within a neighborhood reports on the same coyote incident) and to verify the accuracy of reports (to the extent this is possible). A comparison of data collected by our web site to phoned-in incident reports received by the City of Los Angeles Animal Services agency (or other agencies within the geographic scope of our data collection) may be possible and may reveal additional useful information about human-coyote conflict situation, at least in terms of trends through time. However, data analysis will require additional funding to support such efforts.

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The idea for this web site grew out of a discussion with my colleague Greg Giusti, who was familiar with the web site created by Maggi Kelly, at UC Berkeley, for the purpose of collecting observations of the spread of sudden oak death in Northern California. I am grateful to Maggi Kelly and her lab, especially to Karin Tuxen-Bettman, for turning our original concept into a functioning web site. Additional project cooperators Craig Coolahan and Ray Smith provided support and encouragement to apply for funding for this project, as well as feedback on the specific ways to make the web site most useful.

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