2010

Drug-Induced Deaths in Maine 1997-2008, with Estimates for 2009

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Executive Summary

In the twelve years from 1997 through 2008 the State of Maine lost 1445 lives due to the toxic effects of drugs. In each of these deaths one or more drugs was mentioned on the death certificate as a cause of death or a significant contributing factor. The deaths themselves are tragic, but they represent just the tip of an iceberg that includes the negative impacts to public safety and health resulting from drug misuse, abuse and drug trafficking.[1] These mortality trends ballooned in the period 1997-2002, and have stayed high through 2008, paralleling national trends. Earlier in the study period, the bulk of the deaths were in the southern portion of the state; but in recent years all counties have been affected. It is important to note that the percentages of specific drug involvement in the deaths do not necessarily mirror the percentages of misuse and abuse. Some drugs and drug combinations are more risky than others, and cause death in numbers disproportionate to their use.

Although 21% of these deaths have been due to suicide, most of them, 76%, were unintentional ("accidental overdoses"), and a small minority were undetermined or involved other manners of death (homicide or natural). This report includes all manners of death in the overall drug death statistics.

The vast majority of drug-induced deaths in Maine are due to the effects of pharmaceutical[2] drugs, frequently in combination with other pharmaceuticals, illicit drugs or alcohol. The percentage due to pharmaceuticals has fluctuated around 86%, but increased to 95% in 2008. Involvement of illicit drugs has been implicated in 29% of deaths overall, often in combination with other illicit drugs, pharmaceuticals, or alcohol. During 2008, illicit drug-caused cases decreased to 18%.

When drug combinations are involved in a death, it is often not possible to point to just one substance as the cause. Multiple drugs may interact synergistically, producing a lethal result that would not have occurred if any one of them were ingested alone. For example, narcotics, tranquilizers and alcohol are frequently used together; since all three of these substances reduce the respiratory function, combining them enhances the risk of death due to respiratory depression. Thus, death can occur even when each of the substances is taken in moderation, or at the prescribed dose. In 2008, out of 164 deaths, 71% had two or more drugs or at least one drug and alcohol in combination.

Dangerous drug effects can also be increased with intranasal or intravenous use (producing higher blood levels), or when peak pharmacologic effects of substances happen to coincide. With the opiate drugs, tolerance to drug levels in an individual can be affected by genetics, or by recent abstinence. These factors are difficult to quantify, and can affect both experienced and inexperienced drug users.

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[1] The Office of Substance Abuse estimates that substance abuse costs the state over $600 million dollars per year.

[2] With few exceptions, pharmaceuticals implicated in these deaths are prescription rather than over-the-counter drugs.

Opiates and synthetic opioids (narcotics)[3] are the most common drug category implicated in Maine's drug-induced deaths. This category includes all of the prescription narcotic pain medicines (as well as methadone and buprenorphine), and the illicit drug heroin. Within this large category, methadone is the most common single drug mentioned on death certificates, causing 35.5% of all drug deaths 1997-2008, either alone or in combination with other drugs and/or alcohol. Oxycodone ranks second among the narcotic analgesics, causing 14.7% of all drug deaths. Estimated oxycodone totals for 2009, however, include a doubling of the percentage of deaths from 14% in 2008 to 28% in 2009; for the first time, oxycodone will surpass methadone, which comprises 27% in 2009 estimates. The majority of methadone deaths are due to methadone pills prescribed by physicians for pain, rather than the liquid, which is dispensed in clinics that treat opiate addiction. Buprenorphine, recently approved for use by certified physicians to treat opiate addiction, has been implicated in five deaths in combination with other drugs.

Heroin deaths made up 24% of Maine drug deaths in 2005, but have decreased in both number and percentage beginning in 2006, and were 7% of the 2009 deaths. Heroin and cocaine abused together in a minority of heroin cases. Heroin is frequently used in combination with prescription opiates or tranquilizers.

Cocaine, including both crack and powder cocaine, has been implicated as a cause in 11.6% of deaths over the entire study period, and 14.9% during the more recent period 2004-2008. Cocaine is commonly mixed with heroin: 42 cases over the entire study period. Cocaine has been found combined with methadone in 55 cases over the study period.

Benzodiazepines ("tranquilizers") are implicated as the cause of death in 21% of cases since 1997, somewhat higher (22.9%) since 2005, nearly always in combination with other drugs, usually opiates. Although these drugs are commonly obtained illegally from friends or family or "on the street," in about two-thirds of recent deaths, decedents had ingested benzodiazepines for which they had a legitimate prescription, or were misusing other drugs in combination with their benzodiazepine prescription.

Tranquilizers, narcotic analgesics and stimulants are considered "controlled substances" in Maine from Schedules II, III, and IV, and are tracked by the state's Prescription Monitoring Program. However, a number of non-monitored drugs are appearing more often as causes of death in 2008, usually in combination with other drugs. They include prescription drugs (muscle relaxants, antidepressants, quetiapine, and gabapentin) and the over-the-counter antihistamine and sleep aid, diphenhydramine. Some of these, such as muscle relaxants, quetiapine, and diphenhydramine, have calming effects similar to benzodiazepines.

In conclusion, pharmaceutical opiates and opioids continue to comprise the largest proportion of Maine's drug deaths, frequently in combination with other controlled and non-controlled substances. Within the past year, Maine law has been changed to allow the Chief Medical Examiner access to the states Prescription Monitoring Program to investigate drug deaths for individual decedents. This will potentially improve both the quality and speed of these death investigations. Beyond that, provider and patient education, improved prescription monitoring, and programs collecting unused pharmaceuticals are all helpful in addressing this

[3] The term "opiate" and the term "narcotic" are used in this report as inclusive categories, referring to both natural opiate derivative drugs and synthetic opiate ("opioid") drugs.

problem. Maine's drug mortality mirrors national trends which are receiving considerable attention at this point. Efforts to study and report Maine's experience in both state and national venues need to continue. And research monitoring these deaths will continue to be important in the coming years.

Background

Substance abuse is a critical problem facing the state and local governments of Maine and the communities they serve. Rates of substance abuse—particularly abuse of methadone and other synthetic opiates—increased dramatically in Maine during the early 2000s, as measured by increased incidence of deaths, substance abuse treatment admissions, and drug-related arrests. Substance abuse is associated with many types of crime, increased accidents, lost time at work, serious health problems, social dysfunction, and death.

Government cannot develop effective drug policies without valid and reliable data. To address this need, in 2001 the Office of Chief Medical Examiner first sought funding from the Maine Justice Assistance Council to analyze Medical Examiner data concerning drug-related deaths. A report was first released in 2002.[4] Between 2003 and 2007, a federal grant for the Rural Substance Abuse Partnership Program from the Bureau of Justice Assistance, Department of Justice, allowed continued monitoring and analysis.[5],[6] In 2009, additional funding was provided by the Office of United States Attorneys for Maine to update the data through 2008 in a comprehensive report. This report is the result. It also includes some estimated totals for 2009.

The project represents an ongoing collaborative effort between the Office of Chief Medical Examiner (OCME) and the Margaret Chase Smith Policy Center at the University of Maine (MCSPC).

Methods

Study Population and Data Sources

The study population includes all cases of drug-induced and drug-related deaths in the State of Maine that occurred between January 1st of 1997 and December 31st of 2008. In addition, a preliminary dataset for 2009 cases was used to develop 2009 estimates. For the purpose of this analysis, a drug-induced death is defined as any medical examiner case[7] in which a drug was mentioned on the death certificate as a cause of death or a significant contributing factor.

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[4] Sorg, Marcella H. and Margaret Greenwald (2003) Patterns of Drug-Related Mortality in Maine, 1997-2002. *Maine Policy Review* 12(1):84-95.

[5] Sorg, Marcella H. (2008) Maine Trends and Drug Abuse Patterns: June 2007. In *Epidemiologic Trends in Drug Abuse: Proceedings of the Community Epidemiology Work Group, January, 2007,* pp. 141-149. National Institute on Drug Abuse. Washington, DC.

[6] Sorg, Marcella H. and Marden, K.A. (n.d.) *Drug-Induced and Drug-Related Deaths in Maine: 1997-2006 (draft report)*. Rural Substance Abuse Partnership, Margaret Chase Smith Policy Center, University of Maine.

[7] All drug-induced deaths are considered medical examiner cases in Maine.

The cases may involve *illicit* or 'street' drugs, such as heroin or cocaine. Or, they may involve *pharmaceutical* drugs (prescription or over-the-counter). Drugs may have been diverted from legitimate prescription holders to other individuals, intentionally taken in a manner other than as prescribed, or even taken as prescribed. A drug-related death may also be an unintended consequence of legitimate *prescription drug use,* for example, unexpected drug interactions or adverse individual responses to particular drugs or doses.

Much more frequently, however, drug-induced deaths are due to misuse or abuse of drugs, often involving some form of drug diversion. These deaths are usually unintentional (certified as "accidental" manner of death, commonly termed "overdose"), but they may also be intentional ("suicide"). In deaths where intentionality cannot be demonstrated, the medical examiner would certify the manner as "undetermined." When the death is a consequence of disease, the manner would be ruled "natural."

Cases in which alcohol alone caused the death are not included here. However, alcohol is included in the analysis if it is implicated in combination with drugs. Although inhalation of carbon monoxide is sometimes grouped with other poisoning deaths by epidemiologists, we have excluded those cases from this study. Cases involving inhalation of substances to get "high" are included, however.

Since all drug-induced deaths are medical examiner cases, files housed at Maine's Office of Chief Medical Examiner provided the primary sources of data for this study. These records are the most complete and systematic source of information about victims of drug overdose. The primary data sources in the files are the death certificate, toxicology report, autopsy report, and medical examiner report. The death certificate includes the cause and manner of death, as well as demographic information about the decedent.

This report is an update of Sorg and Greenwald (2002),[8] which included calendar years 1997-2001 and January through June 2002. The current report brings the full dataset up through 2008 and includes estimated trends for 2009. Most of the trend analyses use all calendar years beginning in 1997. In order to mitigate the small population errors, we aggregated the data into four three-year periods when examining subcategories or substate regions.

Investigation of Drug-Related Deaths in Maine

Usually the first responders at an overdose scene are local law enforcement personnel and/or emergency medical services. Sometimes deaths occur in the hospital, hours or days after the overdose event. Examination by the medical examiner takes place either at the location where death occurred, e.g., at a residence, or at the funeral home later. If there is a question about the medical cause of death, particularly in a younger person, an autopsy is ordered. These are all done at the Office of Chief Medical Examiner in Augusta. Although in the earlier years of the study period nearly all overdoses were brought in for autopsy, in recent

[8] Sorg, Marcella H. and Margaret Greenwald (2002) *Maine Drug-Related Mortality Patterns: 1997-2002*. Maine Office of Attorney General, Augusta. www.maine.gov/ag/pr/drugreport.pdf

years, due to the increasing caseload, the autopsy rate is about 65-75%. All suspected drug-induced deaths, however, receive a physical examination by a medical examiner, including full toxicology testing.

Generally a blood sample is taken for toxicology by the medical examiner when the postmortem examination is done. If the death occurs in the hospital, the Office of Chief Medical Examiner (OCME) will request the admission blood specimen for forensic testing, if it is available, along with the medical record. In cases where a blood sample is not available, for example, if the body is decomposed, other tissues or fluids may be tested. In autopsied cases, there may also be additional testing, such as microscopic studies (histology) of the heart muscle. In order to interpret toxicology results it is necessary to obtain medical records, including pre-existing medical conditions, as well as prescriptions the person may have, when those prescriptions were last filled, and how many pills are remaining. Often the decedent may be receiving medical treatment from multiple providers, especially if there have been mental health or substance abuse problems in addition to primary care. They may have utilized multiple pharmacies which may initially not be known to investigators or next of kin. Information from the police investigation may also be needed to illuminate the events surrounding death.

Thus, drug deaths require more time and staff effort than most other types of cases. Toxicology testing is done at a laboratory out of state. Although histology testing is done at the OCME, there is only one part-time histology technician. Toxicology and histology testing can add weeks to the death certification timetable. Staff at the OCME must locate and request medical records for the decedent. The autopsy results must be processed. Only when all of these sources of data are present can the OCME pathologist do a final determination of cause and manner of death. Often these complex cases can take several months to complete.

The Maine OCME certifies the identification of the decedent, along with the medical cause of death, and the manner of death (accident, suicide, homicide, natural, or undetermined). If the death was caused by the toxic effects of one or more drugs or alcohol, those substances are mentioned on the death certificate. Drugs may be mentioned in Part I of the certificate as a cause, or in Part II as a significant factor contributing to death.

Cause of Death

The death certificate allows up to four linked causes of death, as well as a category for other significant factors contributing to the death. On some death certificates, the immediate cause of death may not be the drug itself, but may be a consequence of the drug's presence. For example, the immediate cause of death might be noted as lack of oxygen to the brain (brain anoxia), but the anoxia is in turn caused by methadone toxicity. Methadone would then be listed on the death certificate as an underlying cause. Similarly, some deaths occur as a direct consequence of disease, but drug use or abuse may be a significant factor in the victim's inability to survive disease processes. For example, in certain dosages or circumstances, a tricyclic antidepressant, such as amitriptyline, may increase the potential for a cardiac arrhythmia. Death may be due to underlying heart disease, but the drug contributes to the

cardiac malfunction. In such cases, cardiac disease is the cause of death, but that specific drug may be listed as a significant contributing factor on the death certificate.

The toxicology report includes a listing of drugs identified in a person's system at the time of death, along with the amount of the drug present.[9] Interpretation of toxicology findings is often complex and includes careful consideration of details from the victim's autopsy, medical history, and the circumstances surrounding the death. When there is an extended time between the death and discovery of the body, the drug chemicals are more likely to have degraded into their metabolites. For example, heroin metabolizes quickly to morphine in the body. Once that occurs, prescription morphine and illicit heroin cannot be differentiated.

The relationship between postmortem drug levels and the cause of death is not always straightforward. Vulnerability to drug toxicity may be increased by the presence of underlying disease. Conversely, vulnerability to underlying disease may be enhanced by drug toxicity. Drug levels that are toxic in some individuals may overlap with drug levels that are therapeutic for other individuals, as they do for methadone. In the case of methadone, the overlap between therapeutic and toxic drug levels is due to individual differences in opiate tolerance, which can have genetic, pathologic, and behavioral causes.

Drugs may interact with each other in dangerous ways. It is possible for an otherwise benign drug at therapeutic levels to be toxic in combination with other drugs. Increasingly in the Maine data, decedents have tended to have multiple drugs in their systems. Combinations of prescription, diverted, and over-the-counter drugs are not uncommon, frequently resulting in synergistic and toxic effects. When multiple drugs interact to cause the death, several drugs may be listed on the death certificate without assigning a primary role to any one of them. When the roles of mixed drugs are too complex to reconstruct individually, the medical examiner may list "polydrug" or "mixed drug" toxicity as the cause of death, without specifying a drug.[10] In recent years there has been an effort to name all of the involved drugs on the death certificate. In cases in which "mixed drug toxicity" (or similar phrasing) was the only cause of death mentioned, we consulted the autopsy and toxicology reports in order to identify which drugs were involved. Most death certificates, however, specify particular drugs.

Not all drugs identified in the toxicology report are related to the cause of death. For example, a person may be on methadone maintenance, but die from an insulin overdose. Methadone would appear in the toxicology findings, but not be connected to the death. In such a case, although the toxicology report identifies methadone, it would not be mentioned on the death certificate. The toxicology report may also include prescription medications the

[9] Toxicology testing includes a broad "coroner's panel" of drugs, including all drugs that are commonly misused or abused, both illicit and pharmaceutical. Forensic procedures require two tests as evidence. First, a screening test is done to identify which of any of these drugs are present. A second test is then done to measure the amount of each drug that is found.

[10] The use of "mixed drug" terminology on the death certificate is less common in recent years, although this type of case remains prevalent. We have reviewed all cases back to 1997 and itemized all significant drugs in "mixed drug/polydrug" cases.

decedent was taking or medications administered by emergency medical technicians during resuscitation attempts.

Manner of Death

The Maine Office of Chief Medical Examiner classifies as accidents any drug deaths due to the unintended or unexpected, acute (sudden or short-term), toxic effects of a drug or poison. Accidental drug deaths include natural disorders if caused by an acute exposure to a drug, such as a stroke which results from acute cocaine intoxication. This designation is consistent with guidelines recently published by the National Association of Medical Examiners (Hanzlick et al. 2002) for determining the manner of death when drugs are involved. Jurisdictions outside of Maine may use different criteria.

Deaths resulting from the known toxic effects of accepted medical treatment, such as digitalis toxicity from treatment of congestive heart failure, are considered natural deaths. When death is a consequence of chronic (long-term) substance abuse, such as withdrawal seizures from chronic drug addiction, or cardiac inflammation (endocarditis) due to chronic intravenous drug abuse, the manner is ruled natural as well. Nevertheless, if a drug is mentioned as a cause of death, regardless of the manner of death, the case is included in this study.

In Maine, a death may be classified as a suicide only if there is a "preponderance of evidence" that the person intended to cause their own death, such as a suicide note, suicide threats or previous suicide attempts. Although drug abuse carries an inherent risk of overdose and death, engaging in risky or reckless behavior is not generally considered sufficient evidence of suicidal intent. Deaths in which there is not enough evidence to definitively resolve the intent (for example, to discriminate between accident and suicide) are ruled undetermined manner.

In this dataset, most of the cases are accidents, and a minority are suicides. We often combine all manners of death statistically. However, when characteristics distinguish suicides from accidents, we report them separately. There are very few drug deaths that are certified as homicide, natural, or undetermined.

Results

Number of Deaths

During the twelve years from 1997 to 2008 the State of Maine lost 1445 lives due to the toxic effects of drugs. These mortality trends ballooned in the period 1997-2002, and have stayed high through 2008. Earlier in the study period the per capita drug death rates were higher in the southern portion of the state; but in recent years all counties have been substantially affected.

It is important to note that the percentages of specific drugs involved in the deaths do not necessarily mirrorr the percentages of misuse and abuse. Some drugs and drug combinations are more risky than others, and cause death in numbers disproportionate to their use. Although 299 (20.7%) of Maine's drug deaths have been suicides, most of them, 1091 (75.5%), were unintentional ("accidental overdoses"), and a small minority, 55 (3.8%), comprised all other manners of death.

In the first year of the series, 1997, there were 34 total drug related deaths; by 2001 that number had risen to 90 **(Table 1)**. By 2005, drug related deaths had risen to 176, 138 of which were accidental overdoses. Estimates for 2009 suggest the total may reach 179, exceeding the 2005 peak.

TABLE 1. NUMBER OF DRUG-INDUCED DEATHS IN MAINE BY MANNER OF DEATH, 1997-2008

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Accident	19	29	34	50	64	124	117	131	138	135	122	128
Suicide	14	25	32	10	26	37	26	26	25	28	23	27
Homicide	0	0	0	0	0	0	2	0	0	0	0	1
Natural	0	0	0	0	0	2	2	0	2	1	1	3
Undetermined.	1	0	0	0	0	2	6	5	11	3	8	5
Total	**34**	**54**	**66**	**60**	**90**	**165**	**153**	**162**	**176**	**167**	**154**	**164**

Figure 1 illustrates the relative proportions of the total drug deaths categorized as accidents, suicides, and other manners. This graph shows that the dramatic increase in the number of deaths over the study period is driven by an increase in accidental overdoses rather than suicides. The number of suicidal drug deaths in Maine has varied throughout the span of the study, ranging from a low of 10 (17%) drug-related suicides in 2000 to a high of 37 (22%) in 2002. The apparent fluctuation is not unexpected given the small numbers. Between 1997 and the peak in 2005, accidental overdoses increased by over 600%, and have stayed fairly high since. Although the 2008 total is 164, the estimate for 2009 is slightly higher than any previous year, 179, likely due to an increase in suicides.

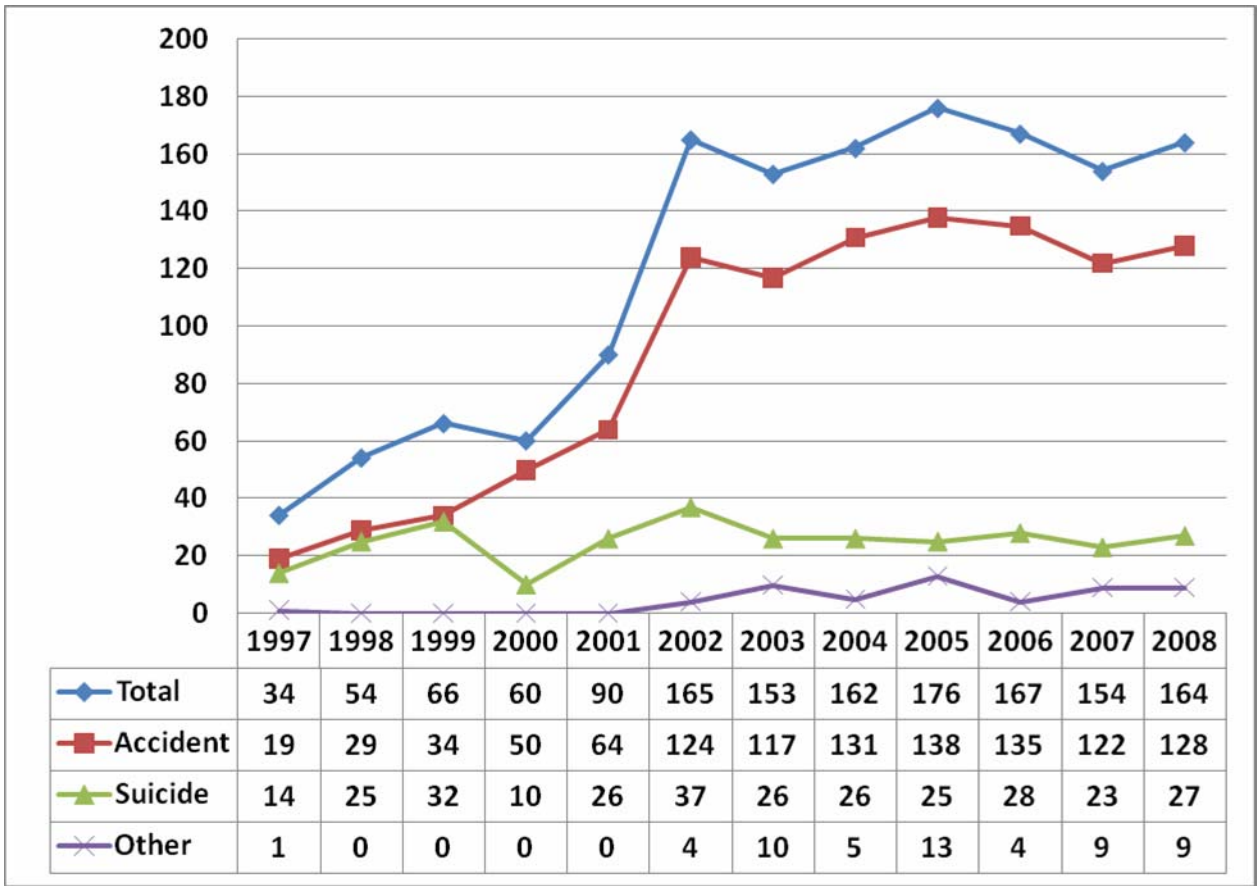
Illicit Versus Pharmaceutical Drugs[11]

The vast majority of all Maine's drug-induced deaths, including all manners of death (86%), are due to the effects of pharmaceutical[12] drugs, frequently in combination with other pharmaceuticals, illicit drugs or alcohol. **Figure 2** illustrates the number of drug deaths caused by pharmaceutical drugs compared with the illicit drugs. Note that these two categories are not mutually exclusive, since some deaths are caused by a combination of pharmaceutical and illicit substances. Geographic distributions of deaths from both types of drugs are similar,

[11] The percentage figures comparing pharmaceutical and illicit drugs do no sum to 100% due to their overlapping presence in some of the decedents.

[12] Most pharmaceuticals implicated in these deaths are prescription rather than over-the-counter drugs.

tracking along the interstate and generally more numerous in areas with higher population density (**Figures 3 and 4**).



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total	34	54	66	60	90	165	153	162	176	167	154	164
Accident	19	29	34	50	64	124	117	131	138	135	122	128
Suicide	14	25	32	10	26	37	26	26	25	28	23	27
Other	1	0	0	0	0	4	10	5	13	4	9	9

FIGURE 1. NUMBER OF DRUG-INDUCED DEATHS BY MANNER, 1997-2008

During 2007 and 2008 the involvement of illicit drugs declined, both in number and percent. As will be shown in a later section, the decline in illicit drugs causing death is seen with both heroin and cocaine. The percentage due to pharmaceuticals has fluctuated around the 86% average, but increased substantially to 95% in 2008. Involvement of illicit drugs has been implicated in 28.8% of deaths overall, often in combination with other illicit drugs, pharmaceuticals, or alcohol. During 2008, illicit drugs involvement decreased to 18.3%.

Accidental and suicidal deaths differ in terms of illicit drug involvement (**Tables 2 and 3**). Accidental overdose victims are more likely (34%) than suicide victims (10%) to have died due to illicit drugs, males (37%) more than females (28%). Males are also more likely to have died from a combination of illicit and pharmaceutical drug (21%) than females (17%). On the other hand, accidents are less likely than suicides (85% versus 94%) to be caused by pharmaceuticals. Male- female differences are greater during the most recent study period, 2006-2008, when pharmaceutical drugs were implicated as a cause of death for 93% of female and 84% of male accidental overdoses. In that same three-year time period, illicit drugs were implicated as a cause of death for 25% of female and 36% of male accidental overdoses.

Suicide deaths are overwhelmingly caused by pharmaceutical (94%) rather than illicit (10%) drugs, with 7% dying from a combination of pharmaceutical and illicit drugs. Among

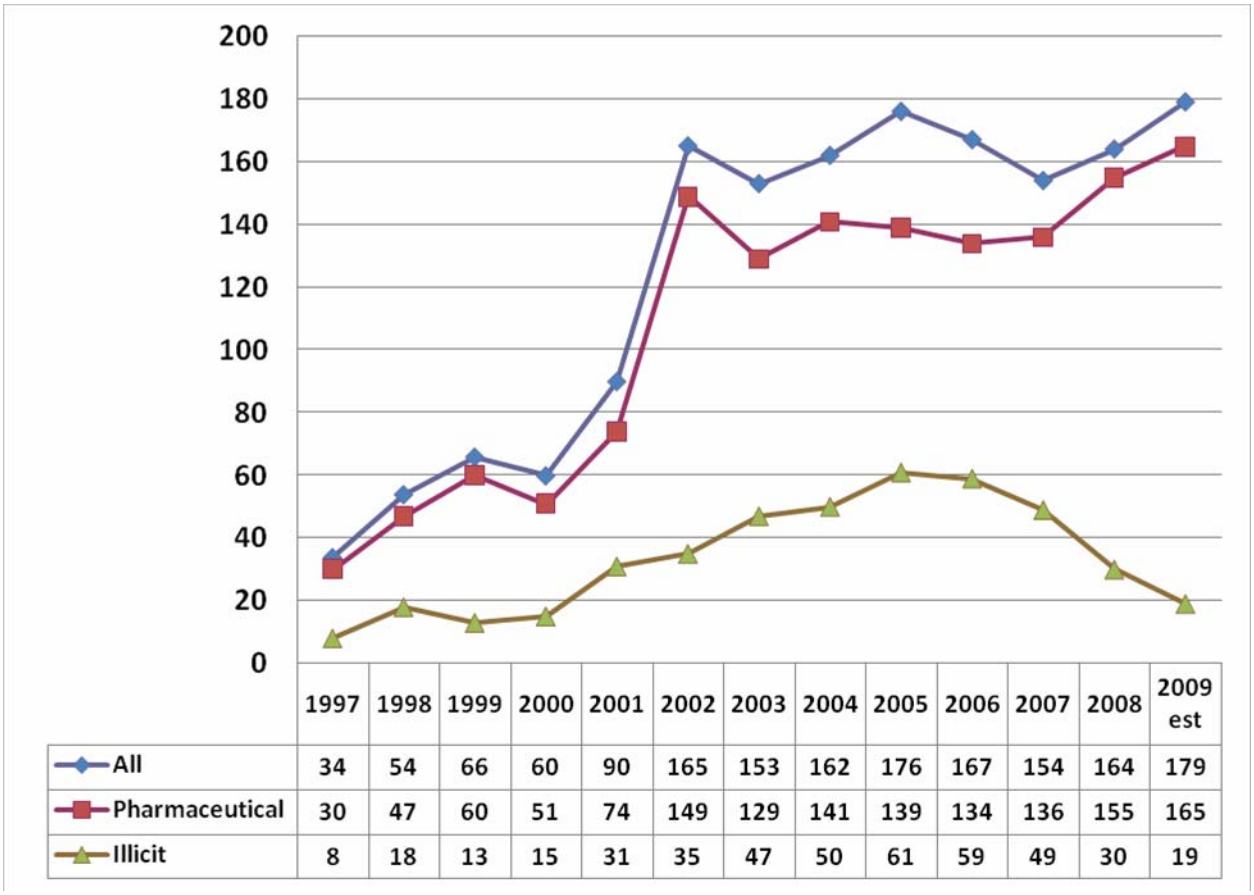
suicide victims, females are slightly more likely (12%) than males (8%) to have died from illicit drugs. However, the overall patterns are very similar for both genders, and those patterns have been fairly constant over the twelve years of the study.

TABLE 2. INVOLVEMENT OF PHARMACEUTICAL VERSUS ILLICIT DRUGS AMONG ACCIDENTAL OVERDOSE VICTIMS OVER TIME AND BY GENDER

	1997-1999	2000-2002	2003-2005	2006-2008	TOTAL
Male-% Any Pharmaceutical	81%	83%	81%	84%	83%
Male-% Any Illicit	47%	34%	38%	36%	37%
Male-% Combined Pharm/Illicit	28%	19%	20%	21%	21%
Female-% Any Pharmaceutical	80%	91%	86%	93%	89%
Female-% Any Illicit	40%	22%	32%	25%	28%
Female-% Combined Pharm/Illicit	20%	13%	18%	17%	17%
Both genders-% Any Pharmaceutical	80%	86%	83%	87%	85%
Both genders-% Any Illicit	45%	30%	36%	32%	34%
Both genders-% Combined Pharm/Illicit	26%	17%	20%	20%	20%

TABLE 3. INVOLVEMENT OF PHARMACEUTICAL VERSUS ILLICIT DRUGS AMONG SUICIDE OVERDOSE VICTIMS OVER TIME AND BY GENDER

	1997-1999	2000-2002	2003-2005	2006-2008	TOTAL
Male-% Any Pharmaceutical	97%	92%	92%	97%	94%
Male-% Any Illicit	0%	6%	11%	10%	7%
Male-% Combined Pharm/Illicit	0%	3%	8%	8%	5%
Female-% Any Pharmaceutical	100%	92%	93%	90%	94%
Female-% Any Illicit	5%	16%	15%	13%	12%
Female-% Combined Pharm/Illicit	5%	11%	10%	8%	8%
Both genders-% Any Pharmaceutical	99%	92%	92%	94%	94%
Both genders-% Any Illicit	3%	11%	13%	12%	10%
Both genders-% Combined Pharm/Illicit	3%	7%	9%	8%	7%



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009 est
All	34	54	66	60	90	165	153	162	176	167	154	164	179
Pharmaceutical	30	47	60	51	74	149	129	141	139	134	136	155	165
Illicit	8	18	13	15	31	35	47	50	61	59	49	30	19

FIGURE 2. NUMBER OF DEATHS CAUSED BY PHARMACEUTICAL VERSUS ILLICIT DRUGS, 1997-2009

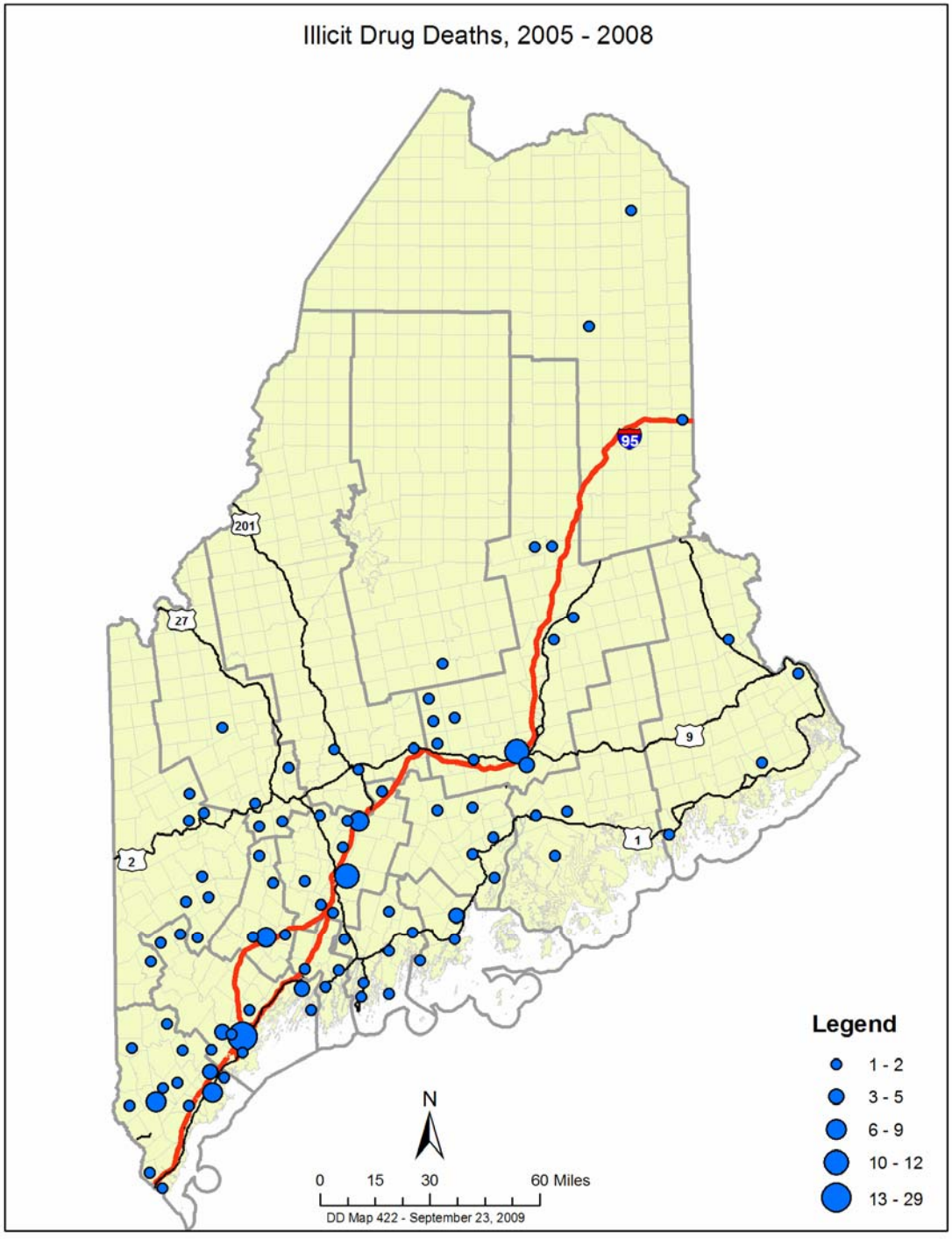


FIGURE 3. LOCATION AND VOLUME OF ILLICIT DRUG DEATHS, 2005-2008

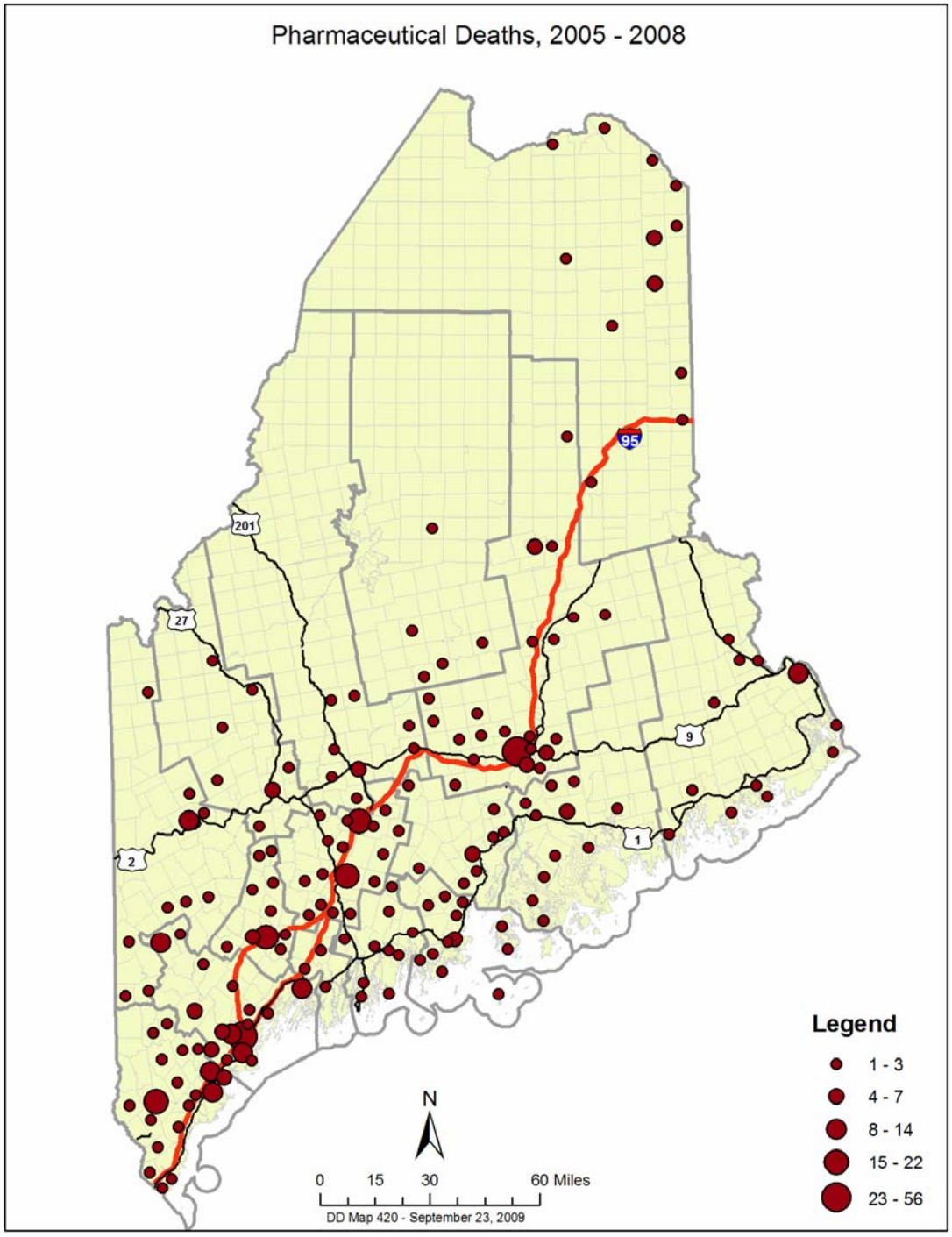
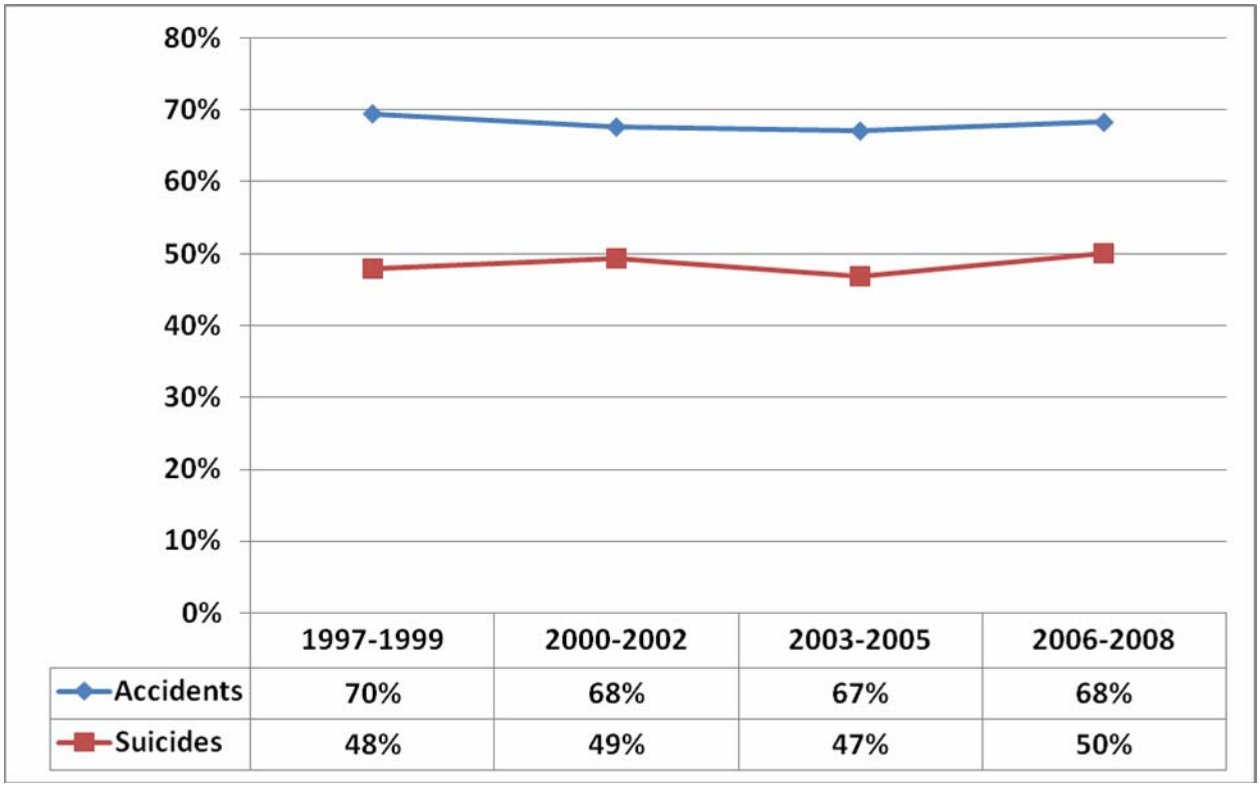


FIGURE 4. LOCATION AND VOLUME OF DEATHS CAUSED BY PHARMACEUTICALS, 2005-2008

Gender and Age Patterns

Accidents and suicides differ from each other in terms of gender distribution (**Figures 5)**. During the study period, the proportion of males and females is almost equal among suicides (48% males), whereas males make up about two-thirds (68%) of the accidental deaths. Because of the relatively small numbers in the annual totals, there is substantial fluctuation from year to year.

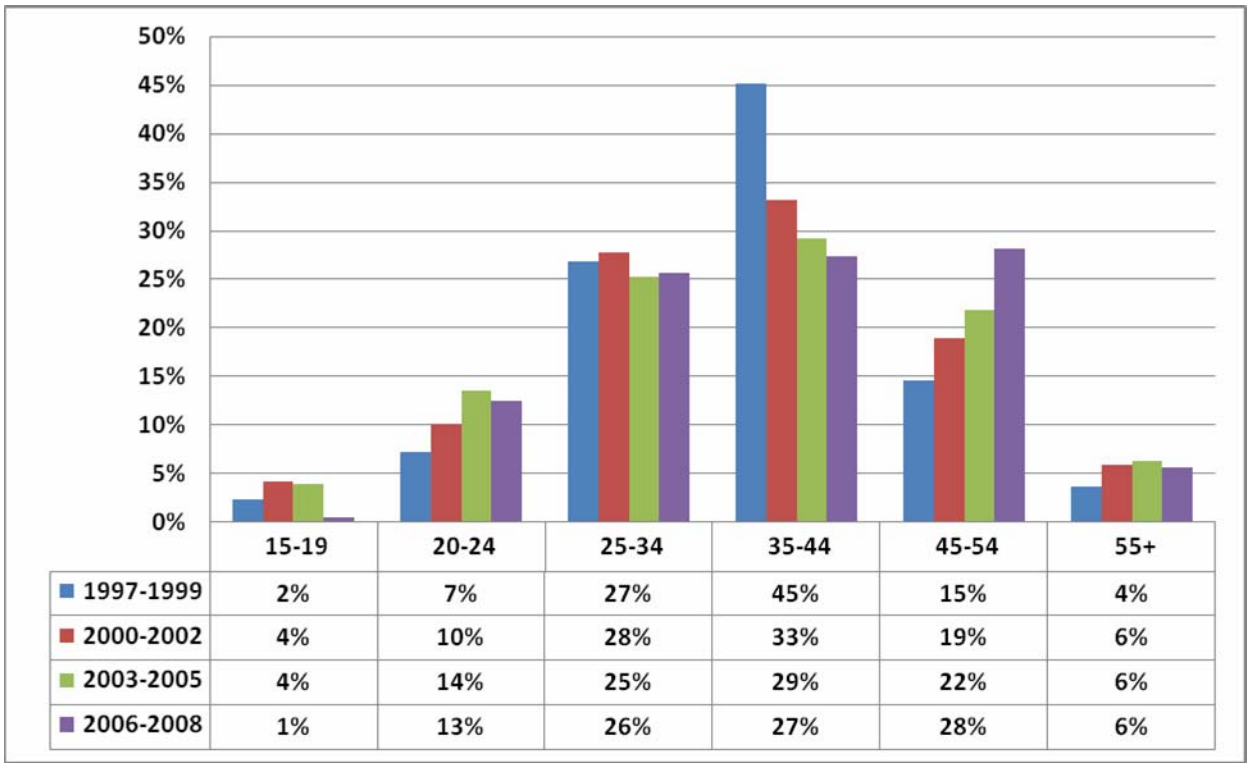


	1997-1999	2000-2002	2003-2005	2006-2008
Accidents	70%	68%	67%	68%
Suicides	48%	49%	47%	50%

FIGURE 5. PERCENT MALES AMONG ACCIDENTS AND SUICIDES, 1997-2008

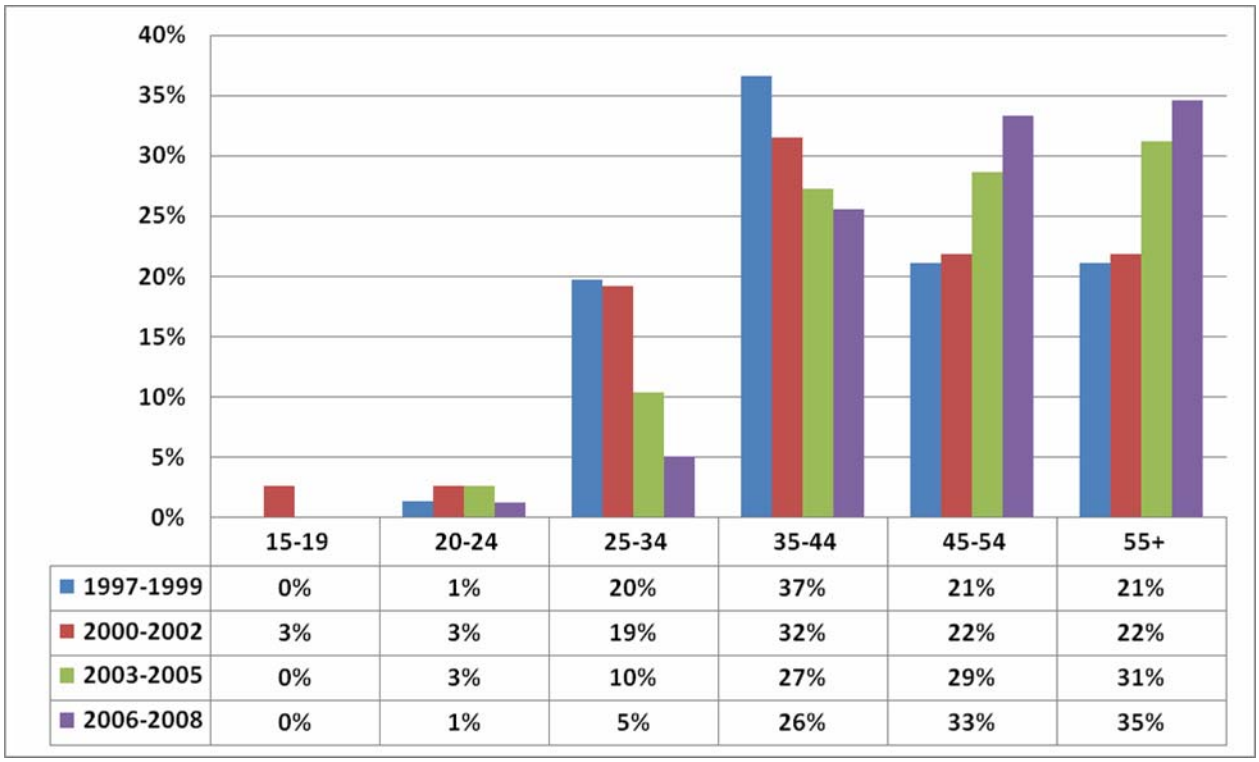
Figure 6 shows the age distribution of accidental overdoses as it changes through time. The 35-44 age group generally has the largest number of decedents, but the percentage in this group declined from 45% to 27%. The 45-54 age group increased meanwhile from 15% to 28%, slightly exceeding the proportion of the 35-44 group during the last period, 2006-2008. The 25-34 age group has remained steady at about one-quarter of the accidental deaths. It is important to note that the proportions of older age groups among the deaths differs from the age proportions among those who abuse drugs, where younger persons are more common. Older drug abusers have more medical problems and are more vulnerable to fatal outcomes.

Figure 7 shows the distribution of decedent ages among suicidal overdoses, who generally tend to be older than the accidental overdose victims. Similar to the trends among the accidents, the suicide age groups 25-34 and 35-44 decline markedly over the study period, with compensatory increases in the 45-54 and 55+ age groups.



	15-19	20-24	25-34	35-44	45-54	55+
1997-1999	2%	7%	27%	45%	15%	4%
2000-2002	4%	10%	28%	33%	19%	6%
2003-2005	4%	14%	25%	29%	22%	6%
2006-2008	1%	13%	26%	27%	28%	6%

FIGURE 6. AGE DISTRIBUTION OF ACCIDENTAL DEATHS, 1997-2008



	15-19	20-24	25-34	35-44	45-54	55+
1997-1999	0%	1%	20%	37%	21%	21%
2000-2002	3%	3%	19%	32%	22%	22%
2003-2005	0%	3%	10%	27%	29%	31%
2006-2008	0%	1%	5%	26%	33%	35%

FIGURE 7. AGE DISTRIBUTION AMONG SUICIDES, 1997-2008

Combining all manners of death and both genders, the average age for all of Maine drug deaths is 40, males at 38 and females 43. Both male and female decedent populations have become older on average through time, suicides more than accidents (**Tables 4 and 5)**. Victims of suicide tend to be about ten years older (average age 48) on average than accident victims (average age 38), and the females tend to be about one year older than the males (48 as opposed to 47). Female victims of accidental overdose tend to be about four years older (average age 40) than males (average age 36).

During the most recent period (2006-2008), female accident victims averaged 42 years old, while males averaged 37. In that same time period female suicide victims averaged 52 years old, while males averaged 51.

TABLE 4. AVERAGE AGE OF ACCIDENTAL OVERDOSE DECEDENTS BY GENDER AND TIME CATEGORY

	1997-1999	2000-2002	2003-2005	2006-2008	ALL YEARS
Male	37	36	36	37	36
Female	36	40	39	42	40
Genders Combined	37	37	37	38	38

TABLE 5. AVERAGE AGE OF SUICIDAL OVERDOSE DECEDENTS BY GENDER AND TIME CATEGORY

	1997-1999	2000-2002	2003-2005	2006-2008	ALL YEARS
Male	44	44	48	51	47
Female	45	46	49	52	48
Genders Combined	45	45	49	51	48

Specific Drugs and Drug Categories

Narcotics: Natural Opiates and Synthetic Opiates (Opioids)[13]

The drug category that has had the most impact on the deaths is the narcotic analgesics (drugs prescribed for pain), particularly methadone (e.g., Dolophine, Methadose) and oxycodone (e.g., brand names Roxycodone, Percocet, Percodan) . These two drugs are synthetic opiates, or "opioids." Other narcotic analgesics that appear regularly include hydrocodone (e.g., Hycodon, Vicodin), hydromorphone (e.g., Dilaudid), fentanyl (e.g., Duragesic patch), propoxyphene (e.g., Darvon), and codeine. Narcotic deaths comprise roughly 70% of Maine's drug-induced deaths.

More recently (2007 and 2008) five deaths have occurred due to the newly available opiate-replacement therapy drug, buprenorphine (e.g., brand names Suboxone, Subutex), generally in combination with other drugs.

[13] Some common brand name examples are provided in the discussion below. It is important to note, however, that postmortem toxicology does not allow implication of specific pharmaceutical products. In addition, these product names mentioned below are not the only products containing these substances, but tend to be more commonly found in death scene investigations and drug seizures.

Narcotic analgesic products specifically designed for extended release may prove more dangerous than lower dose products, because their slow-release mechanisms are damaged when they are crushed for injecting or inhalation, resulting in a more immediate, high-dose ingestion that can be fatal.

Pharmaceutical opiates and opioids can all produce narcotic addiction, as heroin does. Abusers often combine these narcotic analgesics with each other and with heroin for recreational use or to "self-medicate" in order to prevent withdrawal symptoms.

Additional substances taken with narcotics can increase their dangerous effects. The most common toxic effect of narcotics when taken alone or in combination with other synergistic substances (e.g., benzodiazepines, alcohol) is respiratory depression. The resulting toxic event is usually gradual, evidenced by the appearance of deep sleep and snoring, and unfortunately fails to trigger an emergency response among observers until it is too late. Since 2004, 20-30 deaths each year are attributed to narcotic/benzodiazepine combinations.

Methadone and Oxycodone

Methadone has been implicated in more deaths than any other drug in Maine; oxycodone ranks second. Methadone's chemistry causes it to have an extended period of effectiveness, with a delayed peak effect. The delay makes it more risky for abusers who misjudge its lack of immediate action and take more, ultimately producing fatal respiratory depression when the delayed peak effects coincide. Prior to 2002 most of the deaths were due to the liquid form of the drug, used in opiate replacement therapy ("methadone clinics"), which had become more available to treat heroin and prescription narcotic abuse. Tighter regulations regarding take-home doses were implemented in 2002.

At the same time, however, MaineCare (Medicaid in Maine) altered the drugs it approved for pain relief. It removed OxyContin (long-acting form of oxycodone) from the recommended list, and methadone pills began to be used as a substitute for pain management. This change was reflected in the deaths with a greater proportion associated with pills. Recently, in early 2009, the 40 mg methadone pills were heavily restricted by the federal government. Following this restriction, prescriptions for the of 5 mg and 10 mg methadone pill preparations increased in Maine.

Methadone deaths have declined slightly in recent years from a high of 75 in 2004 (**Figures 8, 21, 28**)**,** but deaths from oxycodone have increased (**Figure 9)**. The 2009 estimate for methadone is slightly lower than the 2008 total; however, oxycodone is projected to increase in 2009 to a record number.

In cases where prescription status can be identified, about two-thirds of those who die due to oxycodone toxicity have a prescription. Those who die from methadone toxicity are less likely to have had a prescription. Among the 2008 methadone deaths, approximately one-third had a prescription. Of those with a prescription, two thirds were for pills, rather than the liquid form. Among three-quarters of those without a known prescription, the form of methadone they had ingested was unknown.

In 2007 there were 16 deaths involving methadone and cocaine in combination, a record number; in 2008 that number dropped to 4. It is, however, frequently found in association with other opioids and/or tranquilizers (benzodiazepines).

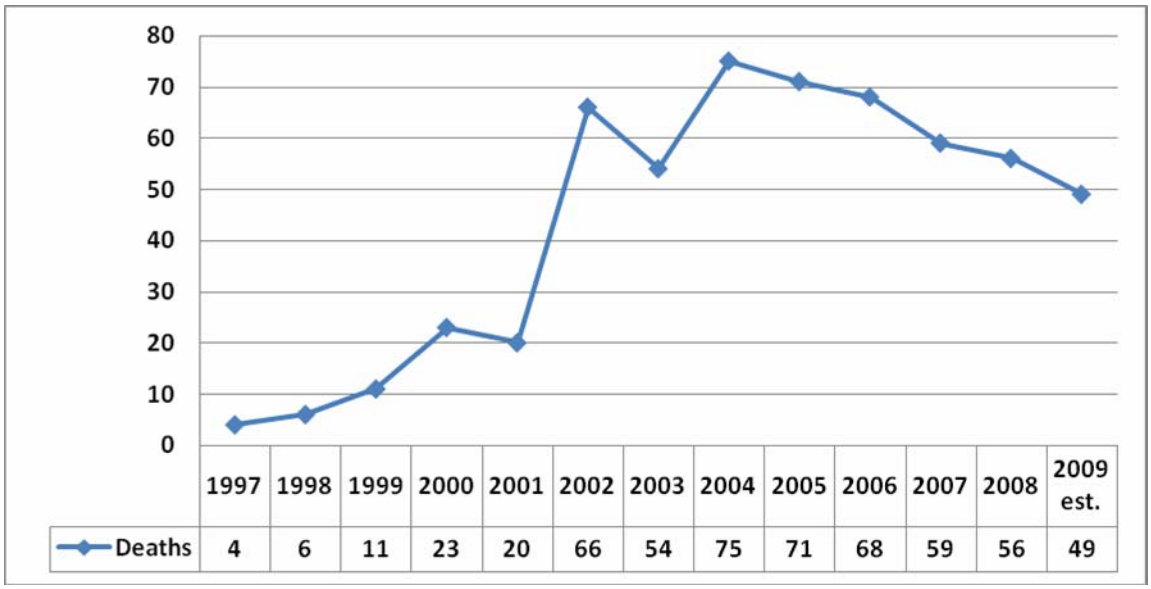


FIGURE 8. NUMBER OF DEATHS CAUSED BY METHADONE

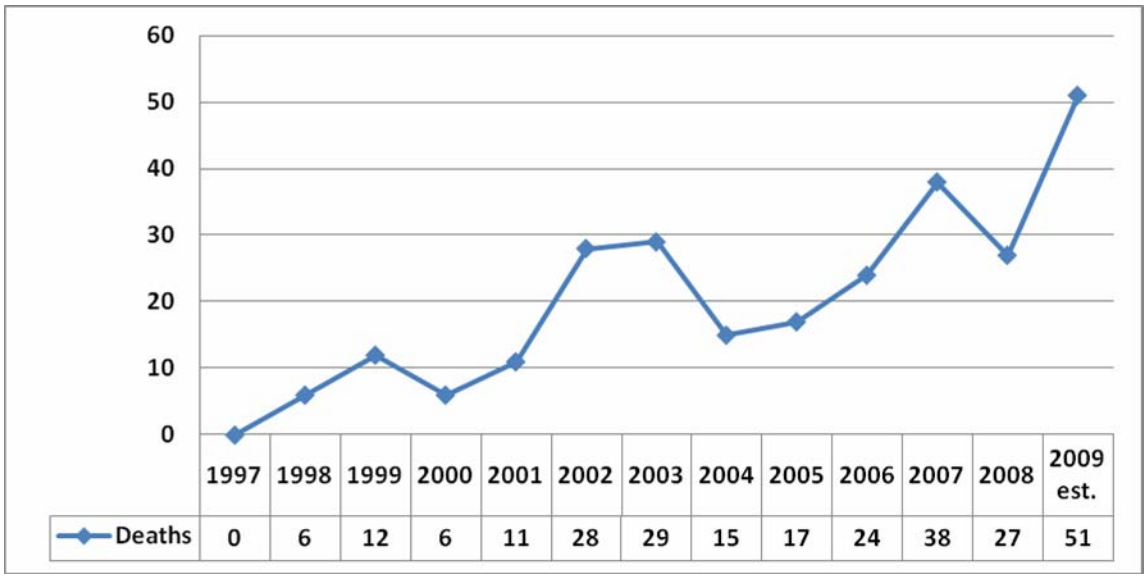
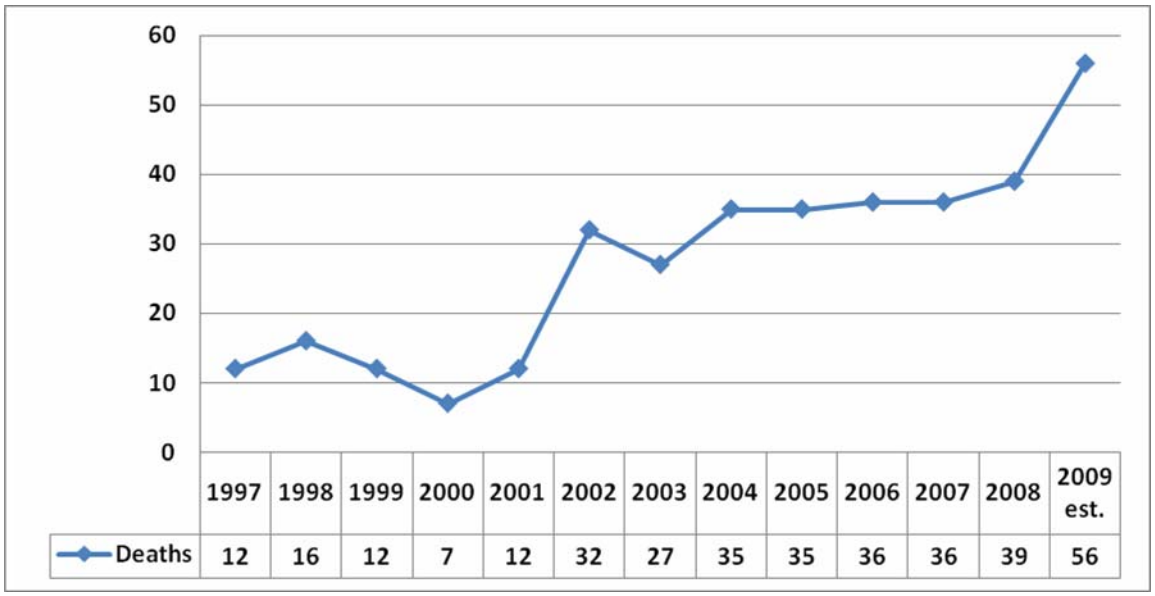


FIGURE 9. NUMBER OF DEATHS CAUSED BY OXYCODONE

Benzodiazepines

Particularly problematic in combination with narcotics are benzodiazepines (tranquilizers prescribed for anxiety or insomnia) and/or alcohol. Benzodiazepines are meant to be used for short-term problems, fewer than 30-90 days at a time. People who take them longer than that on a regular basis frequently become dependent; if that happens, withdrawal needs to be medically supervised. Unfortunately drugs in this category, particularly alprazolam, diazepam, and clonazepam (e.g., brand names Xanax, Valium, and Klonipin), have been implicated more and more frequently as a cause of death, often in combination with other drugs or alcohol. These and other benzodiazepines are very commonly prescribed and readily

available. About two-thirds of the decedents who died as a result of benzodiazepine toxicity had their own prescriptions. Benzodiazepines are mentioned as a cause of death in 26% of 2008 deaths and 29% (an estimate) in 2009 (**Figure 10**). However, the raw number has risen dramatically from 39 in 2008 to an estimated 56 in 2009.



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009 est.
Deaths	12	16	12	7	12	32	27	35	35	36	36	39	56

FIGURE 10. NUMBER OF DEATHS CAUSED BY BENZODIAZEPINES

Muscle Relaxants and Other Drugs with Calming Effects

In addition to benzodiazepines, a number of other drugs have been found more often in postmortem toxicology and increasingly implicated as part of a mixed-drug toxicity that caused death (**Figure 11**). These include prescription muscle relaxants (especially cyclobenzaprine (e.g., brand name Soma), gabapentin (e.g., brand name Neurontin), and quetiapine (e.g., brand name Seroquel). None of these are monitored as controlled substances. The over-the-counter drug diphenhydramine (e.g., brand name Benadryl), an antihistamine which is also included as a sleep aid in several non-prescription products, has also been listed increasingly as a cause of death; this drug was implicated in 14 deaths during 2008. Along with the increase seen in benzodiazepine deaths in 2008, there was also a surge in accidental overdoses implicating the above-mentioned drugs, resulting in the following prevalence measures among the deaths: cyclobenzaprine (6%), quetiapine (8%), and diphenhydramine (9%).

Antidepressants

Antidepressants are more commonly found listed as a cause of death among suicidal rather than accidental drug deaths. Nevertheless they are a frequent finding in all drug-induced deaths (**Figures 11-12**). When implicated in accidental overdoses, antidepressants are generally found as part of mixed-drug toxicology. There was an increase in the number of deaths due to antidepressants from 27 in 2007 to 44 in 2008. The increase was slightly more pronounced among accidental deaths, than among suicides. Accidental deaths due to

antidepressants increased from 18 in 2007 to 32 in 2008, whereas suicides due to antidepressants increased from 8 to 12. More research is needed to explore whether this increase will be part of an ongoing trend.

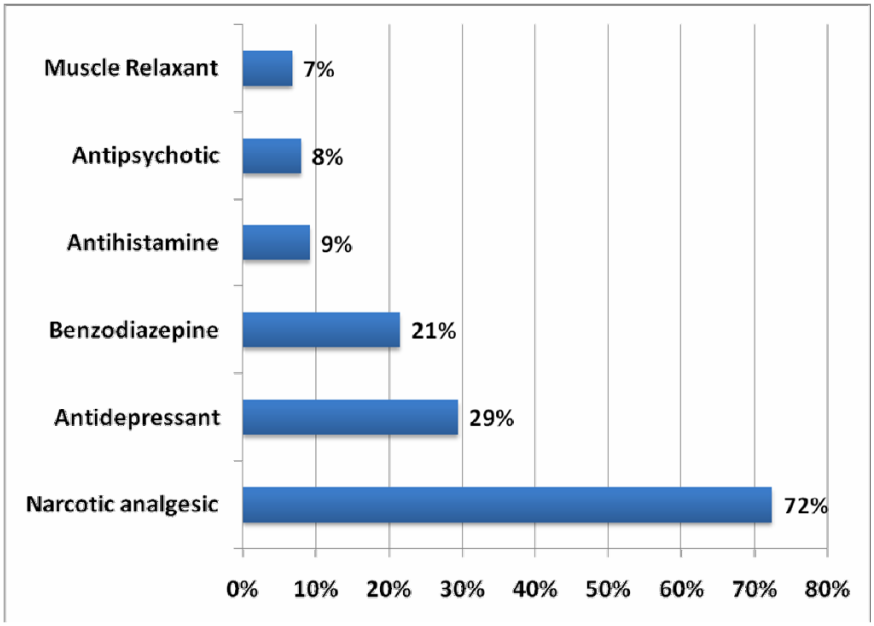


FIGURE 11. PERCENT OF 2008 DRUG DEATHS CAUSED BY SPECIFIC DRUG CATEGORIES

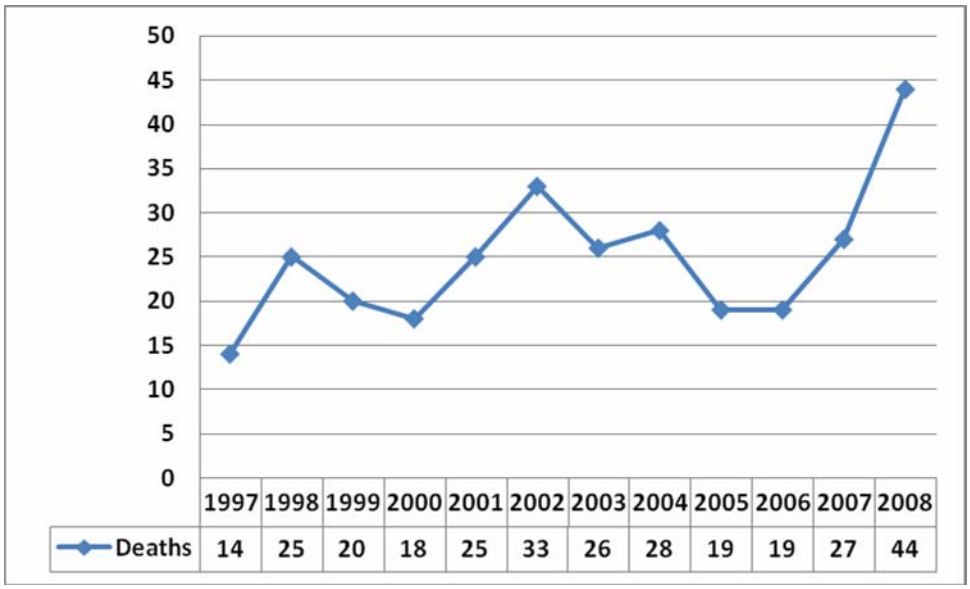
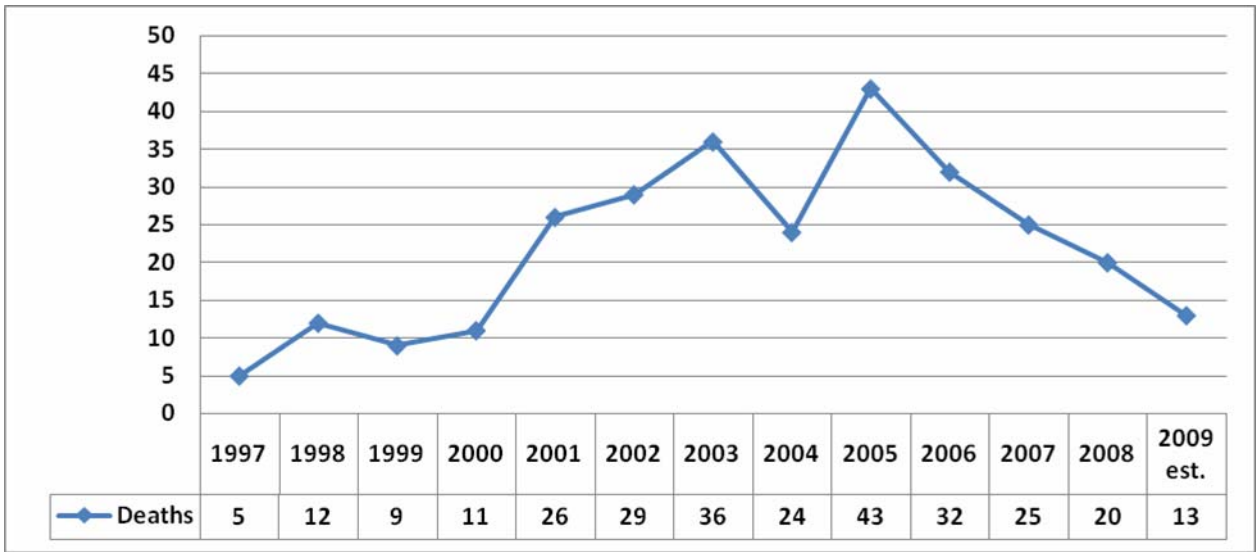


FIGURE 12. NUMBER OF DEATHS CAUSED BY ANTIDEPRESSANTS

Heroin/Morphine

Heroin/morphine deaths have decreased to 20 in 2008, after a peak in 2005 at 43 deaths. Nevertheless, this illicit drug remains an important part of drug death patterns (**Figure 13**). Occasionally combined with cocaine (4-8 deaths per year) or with other narcotics, heroin is usually injected. Users have no way to know the purity of trafficked heroin, putting them at higher risk of overdose. Once in the body, heroin metabolizes quickly to morphine. Thus, in many drug deaths, the toxicology cannot distinguish heroin from other morphine sources, including pharmaceuticals. We have excluded from the "heroin/morphine" counts any cases involving a known pharmaceutical, such as morphine sulfate products.



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009 est.
Deaths	5	12	9	11	26	29	36	24	43	32	25	20	13

FIGURE 13. NUMBER OF DEATHS CAUSED BY HEROIN/MORPHINE

Cocaine/Crack

Deaths from cocaine have decreased recently from 30 in 2007 to 12 in 2008 (**Figure 14**), but this drug is still regularly mentioned on Maine death certificates. Powder cocaine and crack cannot be distinguished in toxicology. During 2005 and 2006 there was a temporary increase in deaths with methadone and cocaine combined; but this combination has become infrequent in the past two years.

Chemical tests of cocaine seized by Maine law enforcement show that about 40% of cocaine samples have been cut with levamisole, a finding mirrored nationally. This substance can cause a depression of normal white blood cell production, which can be fatal. Levamisole has also been found occasionally in Maine decedent toxicology results.

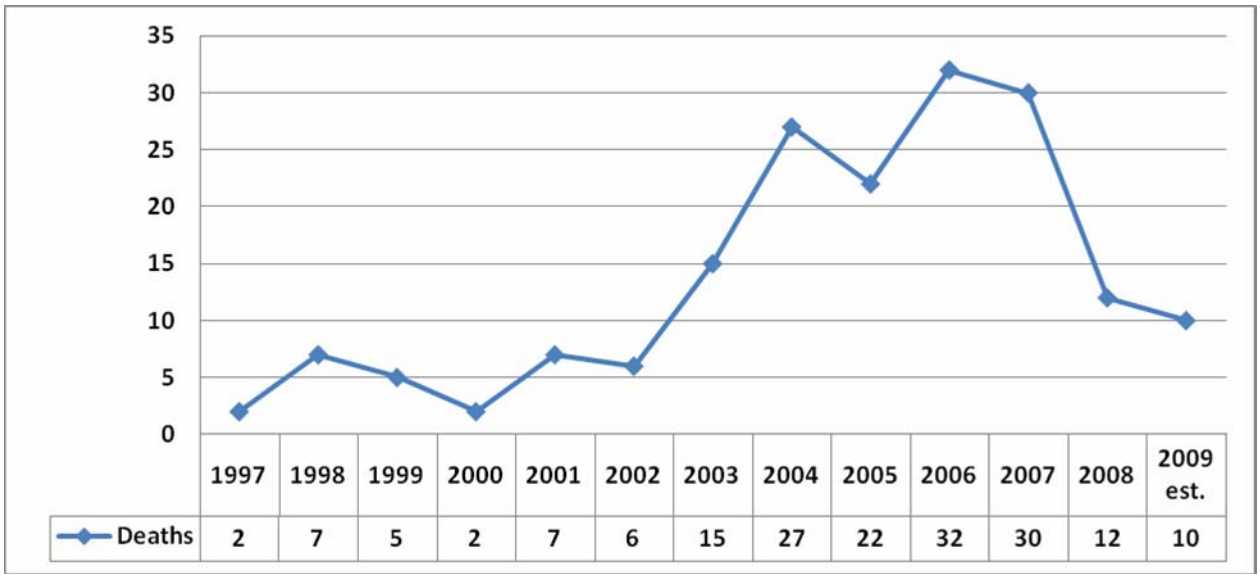


FIGURE 14. NUMBER OF DEATHS CAUSED BY COCAINE

Substate Patterns: Counties and Maine Drug Enforcement Agency Task Force Areas

In this section we report patterns found in each of Maine's 16 counties as well as in each of the Task Force Areas (TFAs) of the Maine Drug Enforcement Agency (MDEA). Because the county populations are relatively small, problems are created when using them to examine trends over time. Totals vary from year to year due to random factors likely not related to drug abuse and trafficking. This type of variation occurs more with small population numbers because the denominators are so small.[14] Thus, although we have provided the totals of drug-related deaths by county and MDEA Task Force below, readers are strongly cautioned in using these numbers to examine trends from year to year within single counties or Task Force Areas, particularly those with smaller populations.

For the purpose of illustrating trends on maps we have converted the totals to rates per 100,000 people in the county's (U.S. Census 2000) population, without adjusting for variation between counties in age structure. By using rates per 100,000, patterns are "normalized" to take into account differences between counties in their underlying population totals. The maps allow counties to be compared with each other visually. When the maps focus on particular drug categories, we report the rates for each two-year segment rather than annually in order to compensate for the smaller totals.

Over the 12-year study period the overall county rates of drug mortality have increased. The increase began in the southern counties, particularly Cumberland and York, and has gradually encompassed the entire state. After peaking in 2004-2005, the rates for cocaine,

[14] For example, if a county experienced three drug deaths in the first year, an increase to five deaths in the next year (two more deaths) would constitute a 67% increase numerically, but would only involve two people. An event that involves only two people in the county may have been just a chance occurrence rather than an indication of a major change in drug abuse trends.

heroin/morphine, and methadone have tended to decrease during the last 2-3 years. That decrease can be appreciated on the maps for most of the counties.

The reader will note that some counties and Task Force Areas fluctuate up and down from year to year. Fluctuation in single years is likely due to small population size and random changes rather than trends in drug trafficking or abuse. Readers are encouraged not to use the annual totals to evaluate program effectiveness. A more accurate appreciation of overall trends can be gained by examining trends over several years at a time.

Drug Deaths by County

Table 6 -7 and Figures 15-16 illustrate trends in the rate of drug deaths per 100,000 in each county. Figure 15 covers 1997-2002 and Figure 16 covers 2003-2008. At the top of each figure there is also a line graph that shows the state totals for all drug deaths (accidents, suicides, and other manners of death) over the same time period. Table 6 provides the total number of drug deaths by county over the entire study period, and Table 7 provides the calculated population rates per 100,000 persons.

Figures 17-18 illustrate trends in the rate of pharmaceutical deaths per 100,000 in each county. Figure 17 covers 1997-2002 and Figure 18 covers 2003-2008. At the top of each figure there is a line graph that shows the state totals for all drug deaths caused by pharmaceuticals, with separate lines for total pharmaceutical deaths, accidents, suicides, and other manners of death over the same time period.

Figures 19-21 illustrate trends in the rates of cocaine, heroin/morphine, and methadone-caused deaths per 100,000 persons, by county. Each of these figures covers one drug category in two-year increments. At the top of each figure there is a line graph showing the state totals for these specific drug categories, by manner of death. Note that all three of these categories have caused fewer deaths in the last two years.

TABLE 6. TOTAL DRUG DEATHS BY COUNTY, 1997-2008

COUNTY			'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08
Androscoggin			2	3	2	4	6	7	10	10	11	11	11	15
Aroostook			3	1	2	0	4	2	5	3	9	5	5	5
Cumberland			11	14	21	21	28	65	45	38	47	25	41	49
Franklin			0	5	1	1	1	4	4	2	6	2	7	1
Hancock			1	1	2	0	5	5	6	7	5	5	4	4
Kennebec			2	9	10	2	5	16	11	29	16	25	16	13
Knox			1	2	1	3	6	6	7	11	8	7	6	7
Lincoln			1	0	1	1	1	3	4	1	3	5	1	1
Oxford			1	1	0	3	4	6	3	6	9	6	6	3
Penobscot			2	6	10	12	10	20	23	17	24	32	17	25
Piscataquis			1	0	0	1	1	1	3	1	1	1	4	4
Sagadahoc			0	0	0	0	2	1	3	3	2	2	2	2
Somerset			1	5	1	2	2	4	4	7	5	3	3	3
Waldo			1	0	1	2	1	2	2	3	2	5	4	1
Washington			1	2	3	0	1	3	7	5	5	11	7	7
York			6	5	11	8	13	20	16	19	23	22	20	24
TOTAL			**34**	**54**	**66**	**60**	**90**	**165**	**153**	**162**	**176**	**167**	**154**	**164**

TABLE 7A. RATE PER 100,000 OF DRUG DEATHS BY COUNTY, 1997-2008**

COUNTY	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'05-'08
Androscoggin	1.93	2.89	1.93	3.85	5.78	6.74	9.63	9.63	10.6	10.6	10.6	14.45	9.25
Aroostook	4.06	1.35	2.7	0	5.41	2.7	6.76	4.06	12.17	6.76	6.76	6.76	6.29
Cumberland	4.14	5.27	7.91	7.91	10.54	24.85	16.94	14.31	17.69	9.41	15.44	18.45	12.2
Franklin	0	16.97	3.39	3.39	3.39	13.57	13.57	6.79	20.36	6.79	23.76	3.39	10.86
Hancock	1.93	1.93	3.86	0	9.65	9.65	11.59	13.52	9.65	9.65	7.72	7.72	6.95
Kennebec	1.71	7.68	8.54	1.71	4.27	13.66	9.39	24.76	13.66	21.35	13.66	11.1	11.95
Knox	2.52	5.05	2.52	7.57	15.14	15.14	17.67	27.77	20.19	17.67	15.14	17.67	14.13
Lincoln	2.97	0	2.97	2.97	2.97	8.92	11.9	2.97	8.92	14.87	2.97	2.97	5.95
Oxford	1.83	1.83	0	5.48	7.31	10.96	5.48	10.96	16.44	10.96	10.96	5.48	8.77
Penobscot	1.38	4.14	6.9	8.28	6.9	13.8	15.87	11.73	16.56	22.08	11.73	17.25	13.52
Piscataquis	5.8	0	0	5.8	5.8	5.8	17.41	5.8	5.8	5.8	23.21	23.21	11.6
Sagadahoc	0	0	0	0	5.68	2.84	8.52	8.52	5.68	5.68	5.68	5.68	4.54
Somerset	1.97	9.83	1.97	3.93	3.93	7.86	7.86	13.76	9.83	5.9	5.9	5.9	5.51
Waldo	2.76	0	2.76	5.51	2.76	5.51	5.51	8.27	5.51	13.78	11.03	2.76	6.62
Washington	2.95	5.89	8.84	0	2.95	8.84	20.62	14.73	14.73	32.41	20.62	20.62	17.68
York	3.21	2.68	5.89	4.28	6.96	10.71	8.57	10.17	12.32	11.78	10.71	12.85	9.53

**Census 2000 county population totals were used to calculate rates. Rates are not age-adjusted.

TABLE 7B. COUNTIES RANKED ACCORDING TO THEIR AVERAGE DEATH RATE PER 100,000 OVER THE PERIOD 2005-2008 (SEE FAR RIGHT COLUMN IN TABLE 7A ABOVE)

County	'05-'08
Sagadahoc	4.54
Somerset	5.51
Lincoln	5.95
Aroostook	6.29
Waldo	6.62
Hancock	6.95
Oxford	8.77
Androscoggin	9.25
York	9.53
Franklin	10.86
Piscataquis	11.60
Kennebec	11.95
Cumberland	12.20
Penobscot	13.52
Knox	14.13
Washington	17.68

When counties are ranked according to their average drug death rate over the period 2005-2008, the highest rank is occupied by Washington, followed by Knox, Penobscot, and Cumberland.

Drug Deaths by MDEA Task Force Areas

Figures 22-23 depict the overall rate of all types of drug deaths per 100,000 population for each of the MDEA Task Force Areas. Figure 22 covers the period 1997-2002 and Figure 23 covers the period 2003-2008. At the top of each figure is a line graph showing the statewide totals by manner of death over the same time period. **Tables 8 and 9** provide the totals and population rates per 100,000 persons in the Task Force area, upon which the maps are based.

Figures 24-25 depict the rate of deaths caused by pharmaceuticals per 100,000 population for each of the MDEA Task Force Areas. Figure 24 covers the period 1997-2002 and Figure 25 covers the period 2003-2008. At the top of each figure is a line graph showing the statewide totals of pharmaceutical deaths by manner of death for those time periods.

Figures 26-28 show the trends in the rates of cocaine, heroin/morphine, and methadone-caused deaths per 100,000 by MDEA Task Force Areas, each in drug category portrayed in two-year increments. Again, at the top of each figure is a line graph illustrating the state totals for these categories, by manner of death.

TABLE 8. TOTAL DRUG DEATHS BY MDEA TASK FORCE AREAS

TASK FORCE	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08
Augusta	5	11	13	8	15	28	27	47	31	44	29	24
Lewiston	3	9	3	8	11	17	17	18	26	19	24	19
Portland	11	14	21	21	28	66	45	38	47	25	41	49
Alfred	6	5	11	8	13	20	16	19	23	22	20	24
Houlton	3	1	2	0	4	2	5	3	9	5	5	5
Bangor	4	11	11	15	13	25	30	25	30	36	24	32
Jonesboro	2	3	5	0	6	8	13	12	10	16	11	11
TOTAL	34	54	66	60	90	166	153	162	176	167	154	164

TABLE 9. RATE OF DRUG DEATHS PER 100,000 POPULATION BY MDEA TASK FORCE AREA

TASK FORCE	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08
Augusta	1.91	4.20	4.96	3.06	5.73	10.69	10.31	17.95	11.84	16.80	11.08	9.17
Lewiston	1.60	4.79	1.60	4.25	5.85	9.04	9.04	9.57	13.83	10.11	12.76	10.11
Portland	4.14	5.27	7.91	7.91	10.54	24.85	16.94	14.31	17.69	9.41	15.44	18.45
Alfred	3.21	2.68	5.89	4.28	6.96	10.71	8.57	10.17	12.32	11.78	10.71	12.85
Houlton	4.06	1.35	2.70	0.00	5.41	2.70	6.76	4.06	12.17	6.76	6.76	6.76
Bangor	1.88	5.16	5.16	7.04	6.10	11.73	14.08	11.73	14.08	16.90	11.27	15.02
Jonesboro	2.33	3.50	5.83	0.00	7.00	9.33	15.16	14.00	11.66	18.66	12.83	12.83

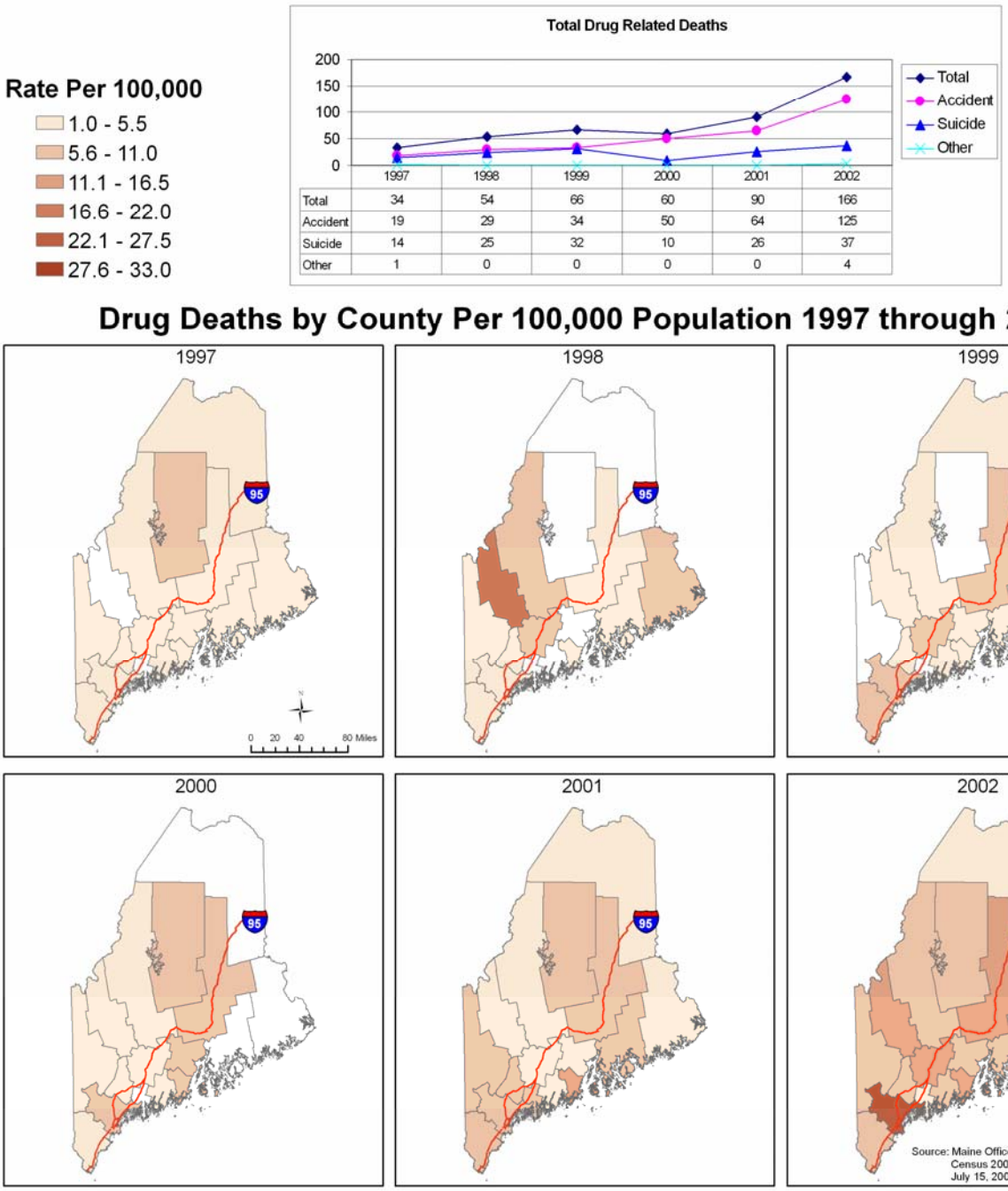


FIGURE 15. DRUG DEATHS PER 100,000 BY COUNTY, 1997-2002

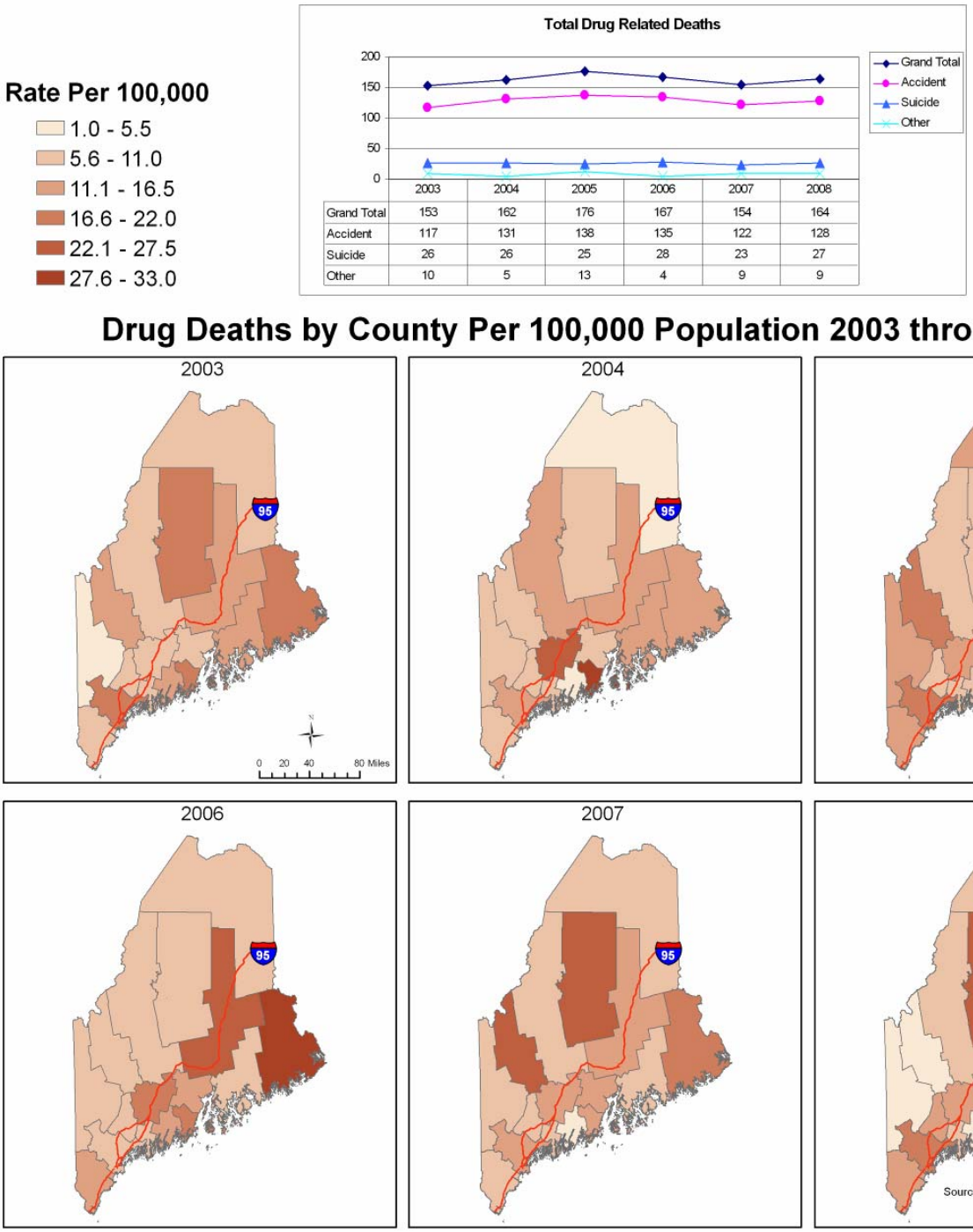


FIGURE 16. DRUG DEATHS PER 100,000 BY COUNTY 2003-2008

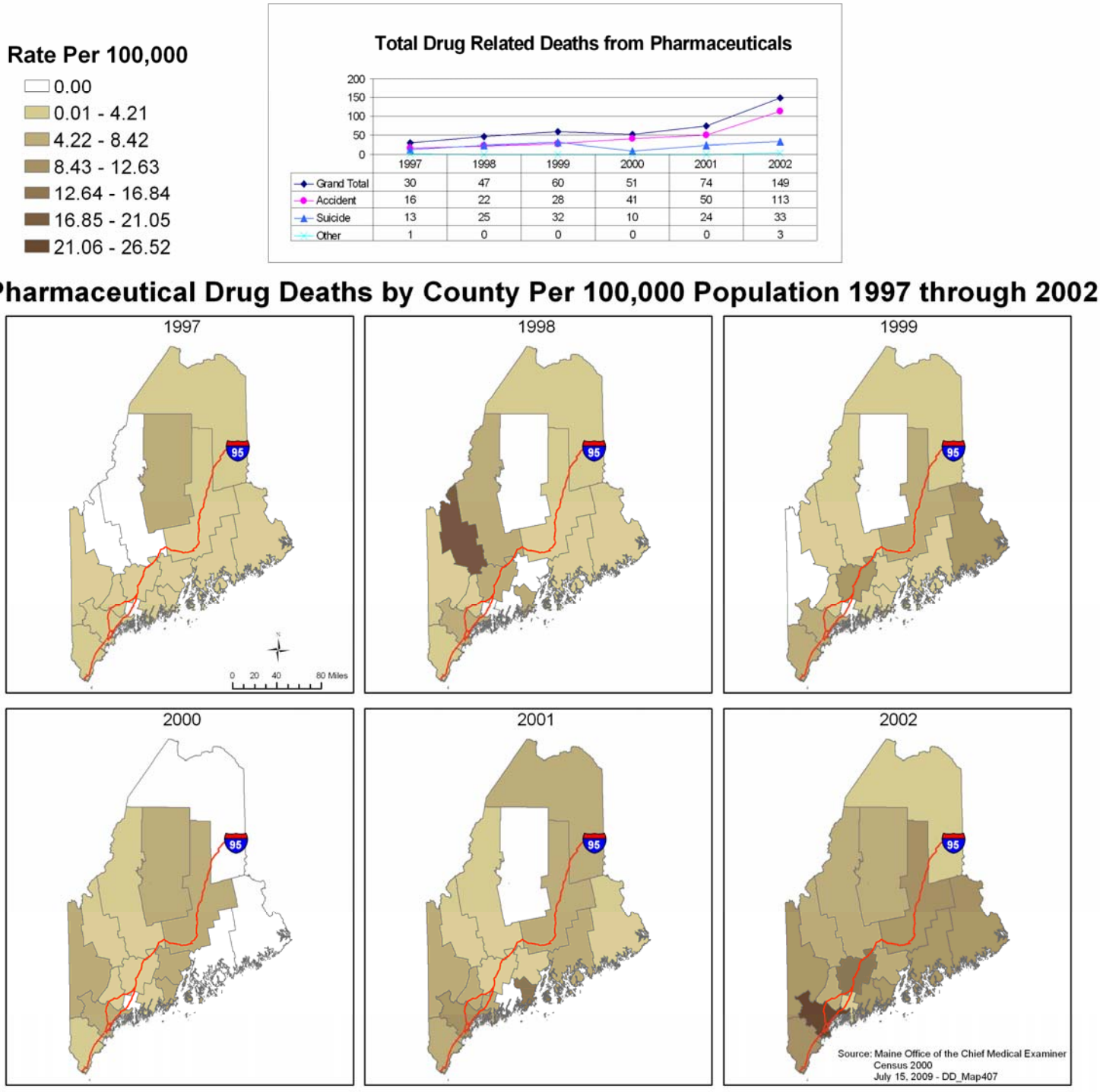
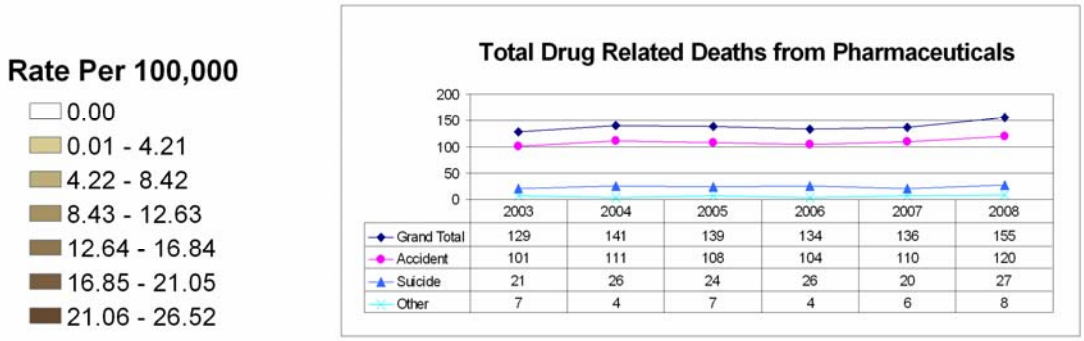


FIGURE 17. PHARMACEUTICAL DRUG DEATHS PER 100,000 BY COUNTY, 1997-2002



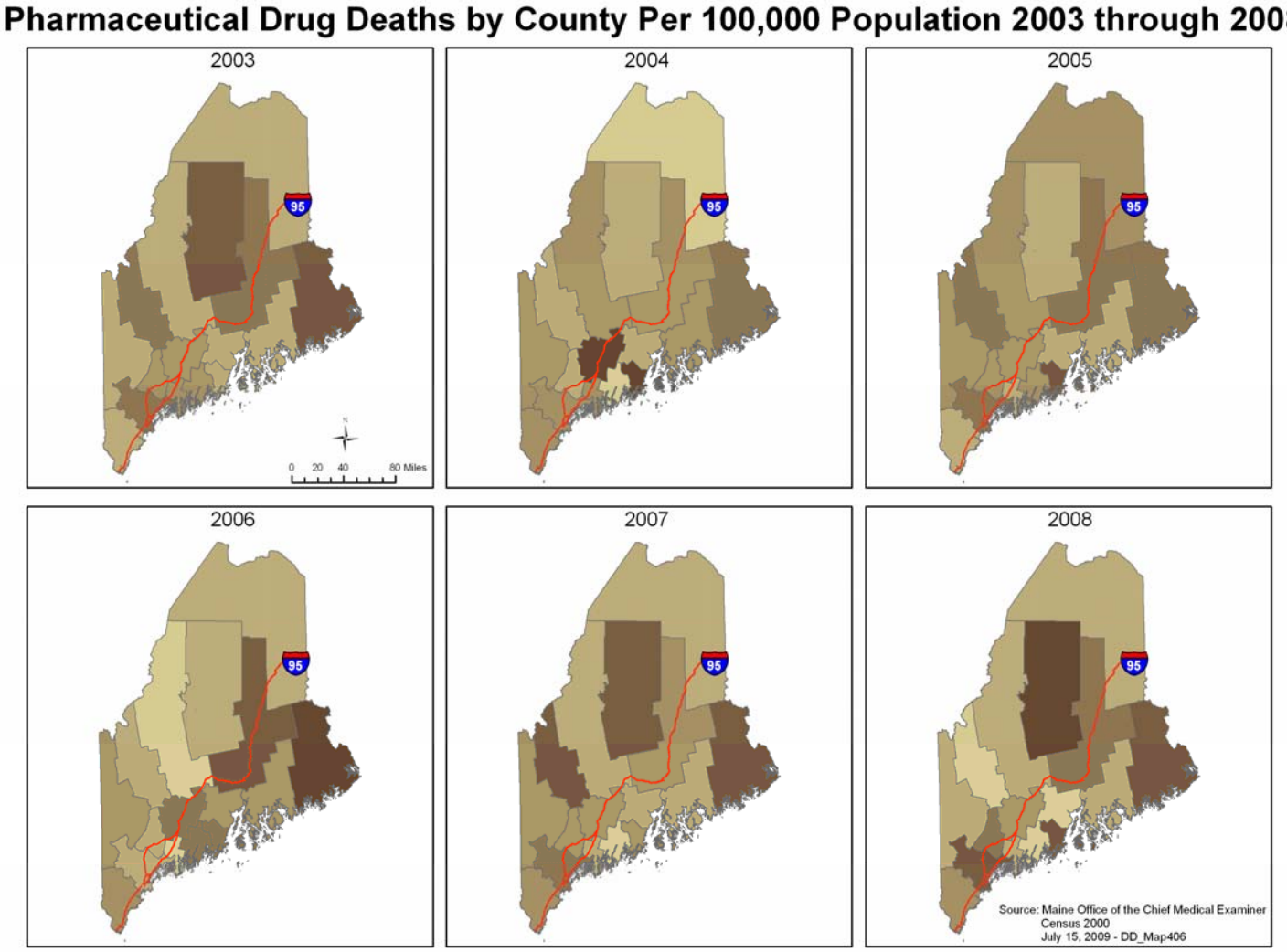


FIGURE 18. PHARMACEUTICAL DRUG DEATHS PER 100,000 BY COUNTY, 2003-2008

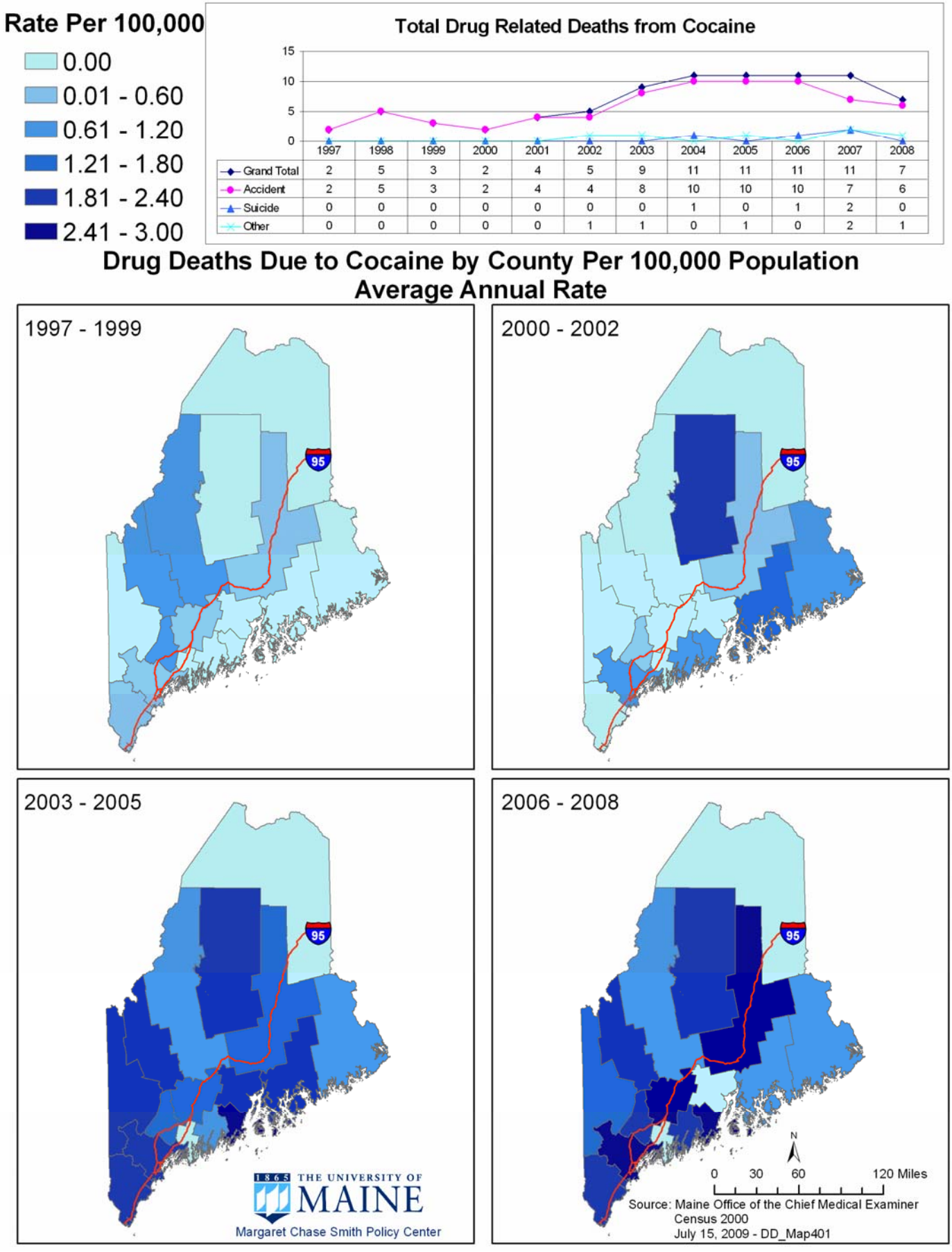


FIGURE 19. COCAINE DEATHS PER 100,000 BY COUNTY, 1997-2008

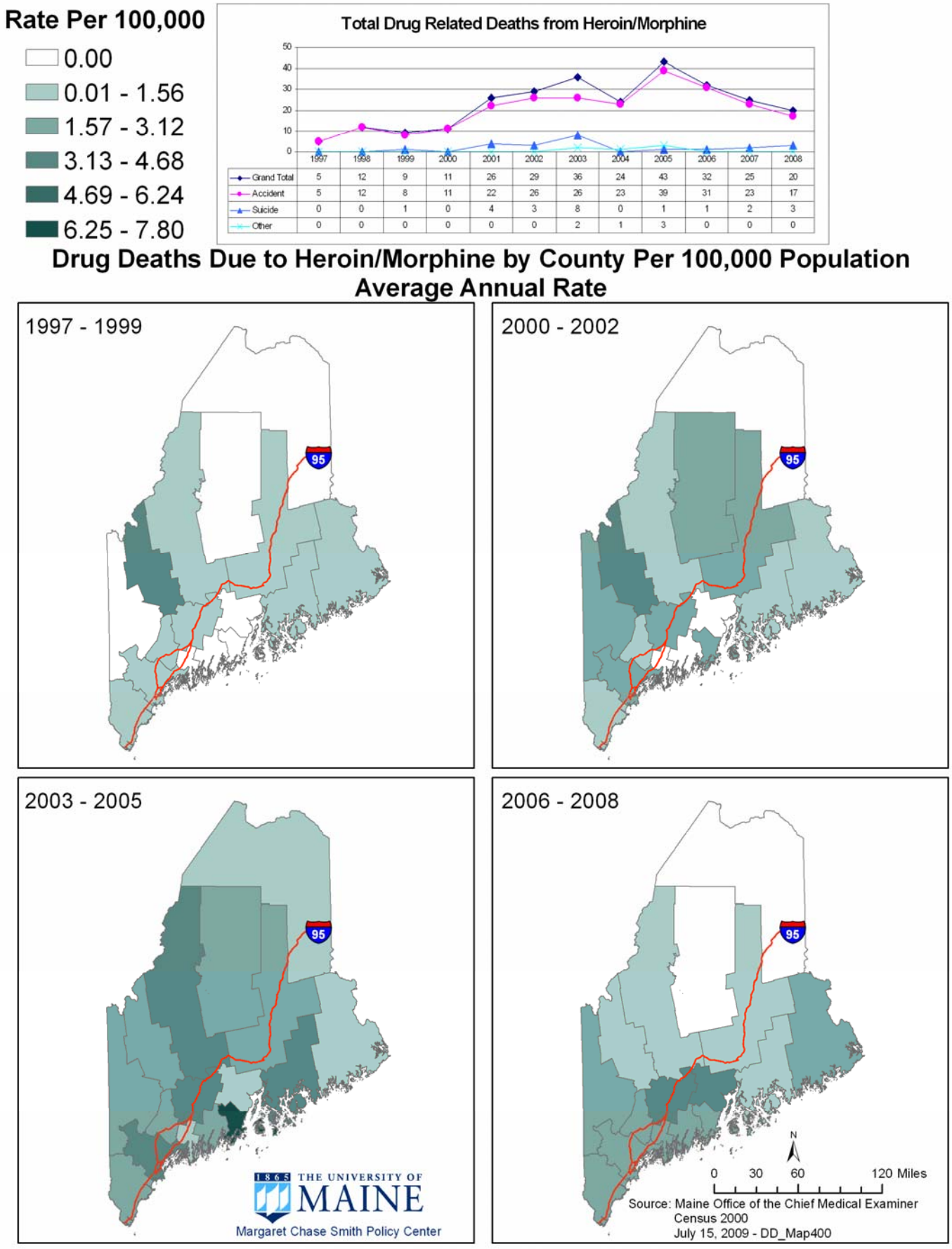


FIGURE 20. HEROIN/MORPHINE DEATHS PER 100,000 BY COUNTY, 1997-2008

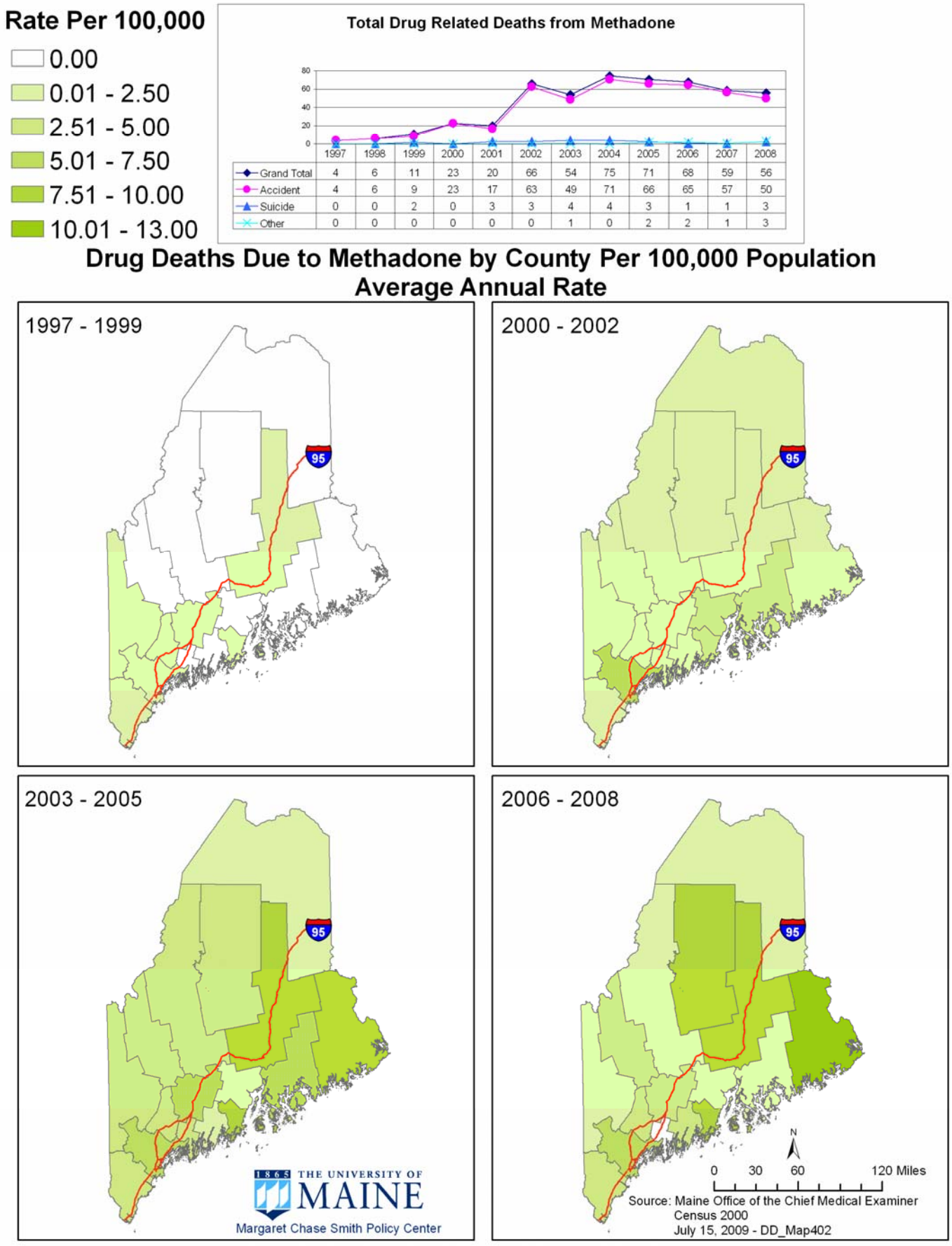


FIGURE 21. METHADONE DEATHS PER 100,000 POPULATION BY COUNTY, 1997-2008

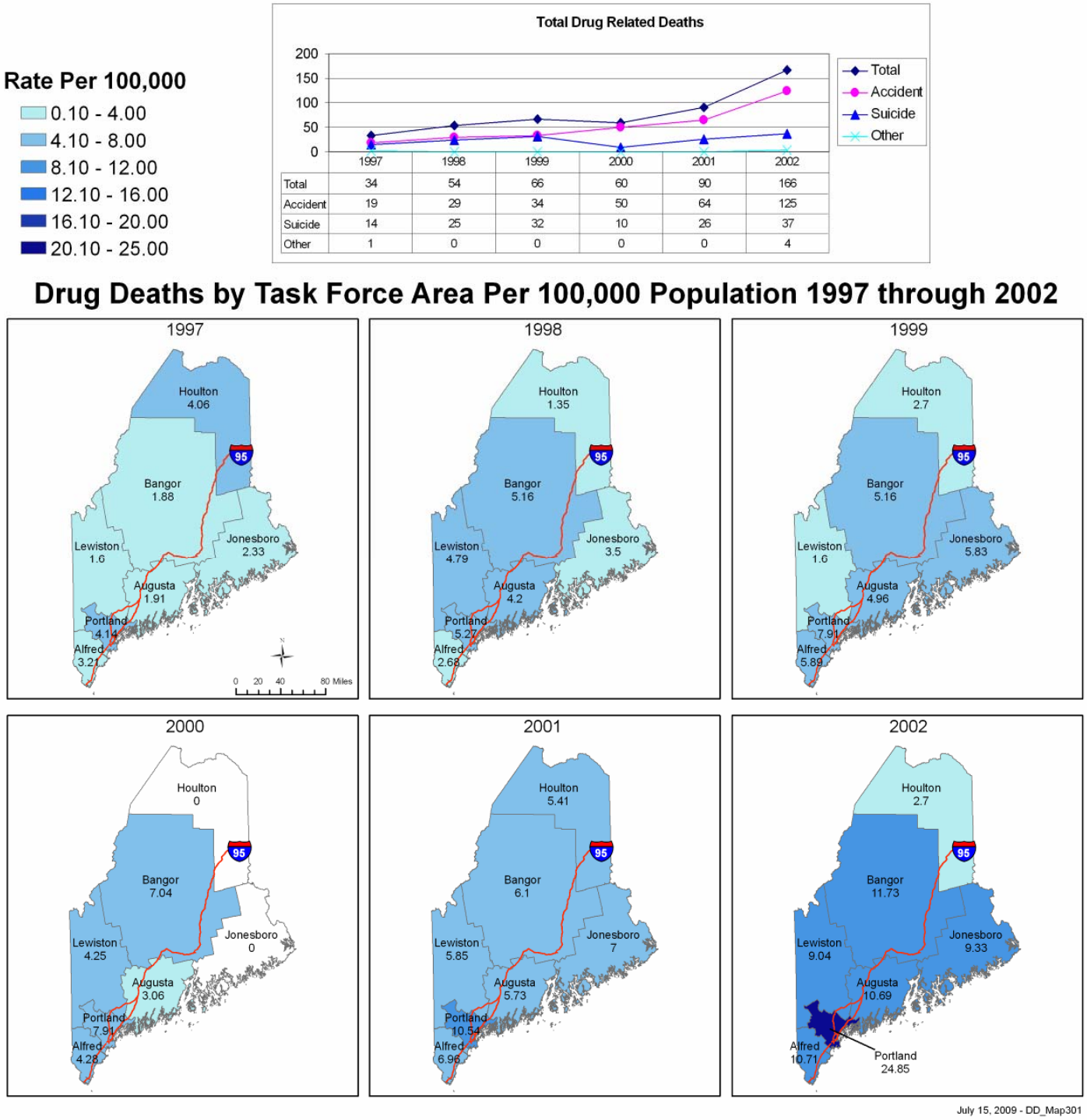
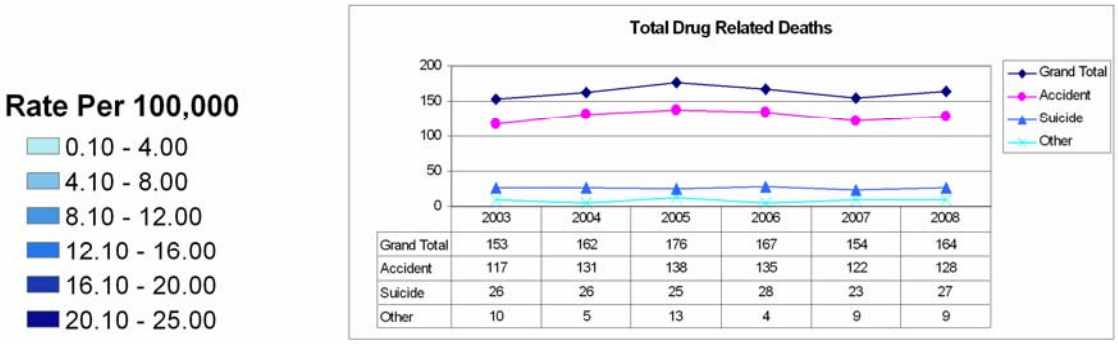


FIGURE 22. DRUG DEATHS PER 100,000 POPULATION BY MDEA TASK FORCE AREAS, 1997-2002



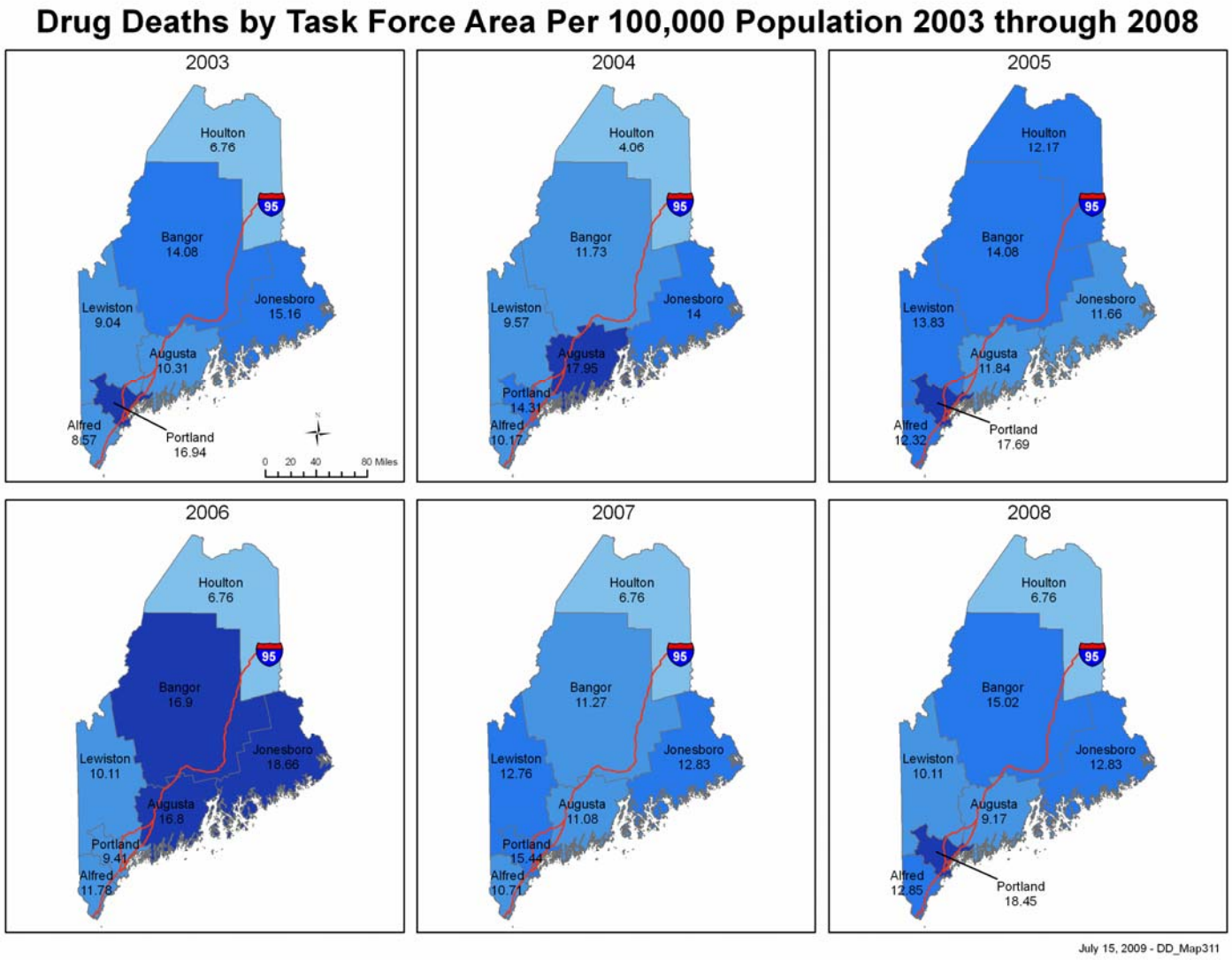


FIGURE 23. DRUG DEATHS PER 100,000 POPULATION BY MDEA TASK FORCE AREAS, 2003-2008

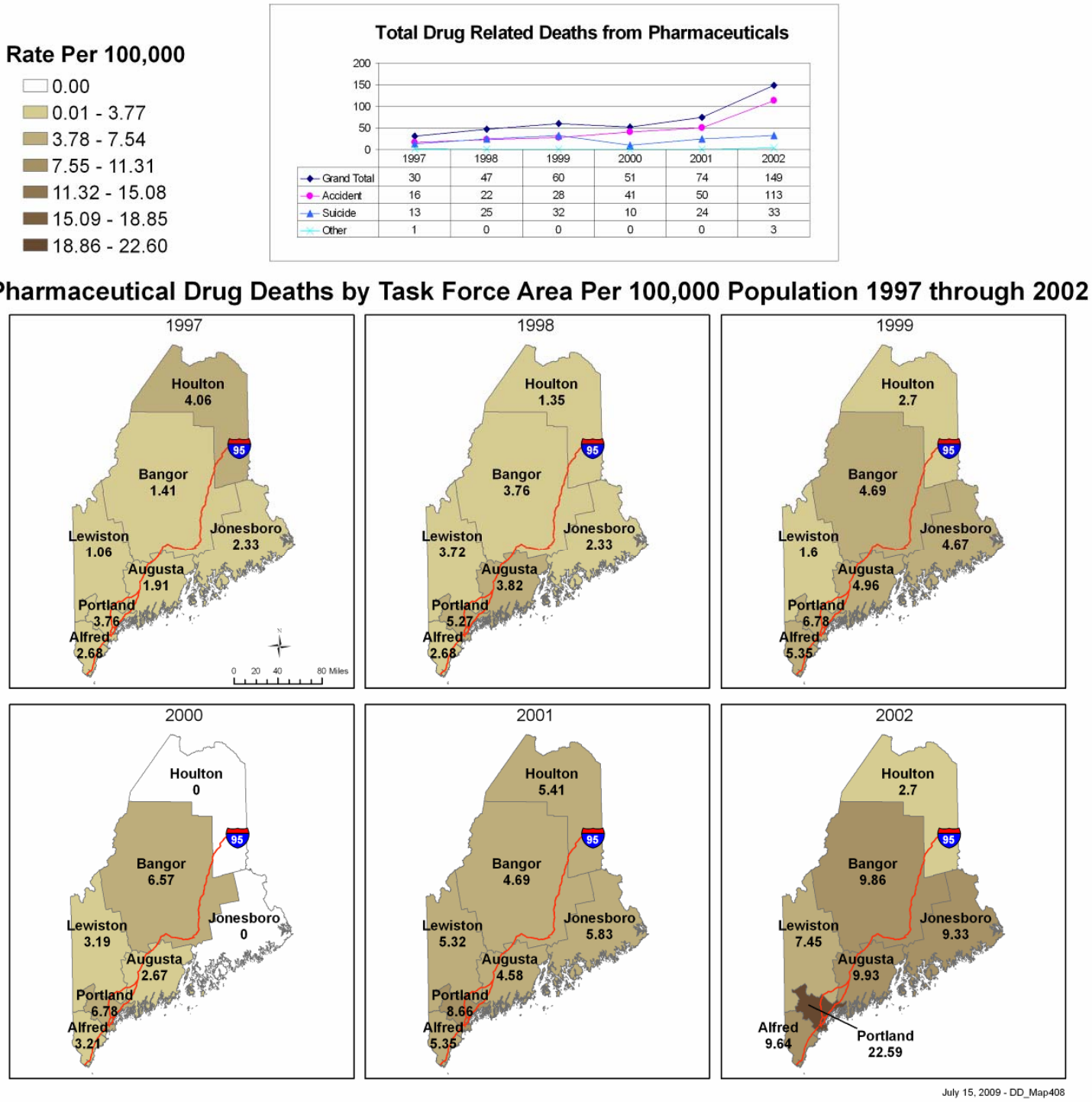
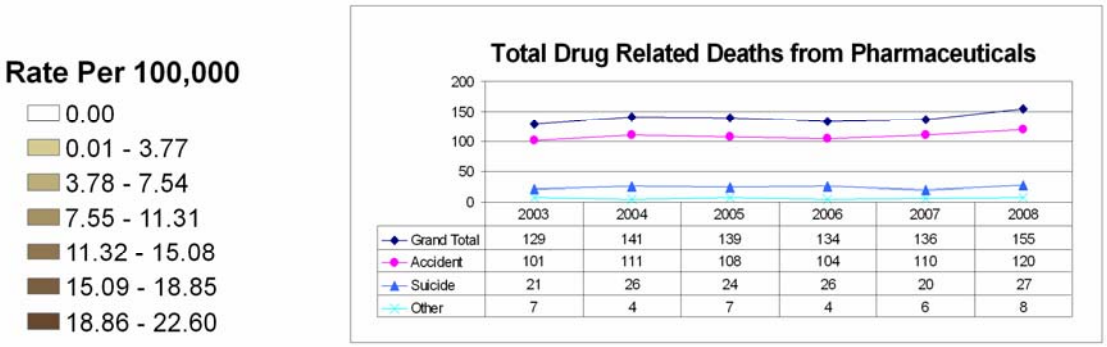


FIGURE 24. PHARMACEUTICAL DRUG DEATHS PER 100,000 POPULATION BY MDEA TASK FORCE AREAS, 1997-2002



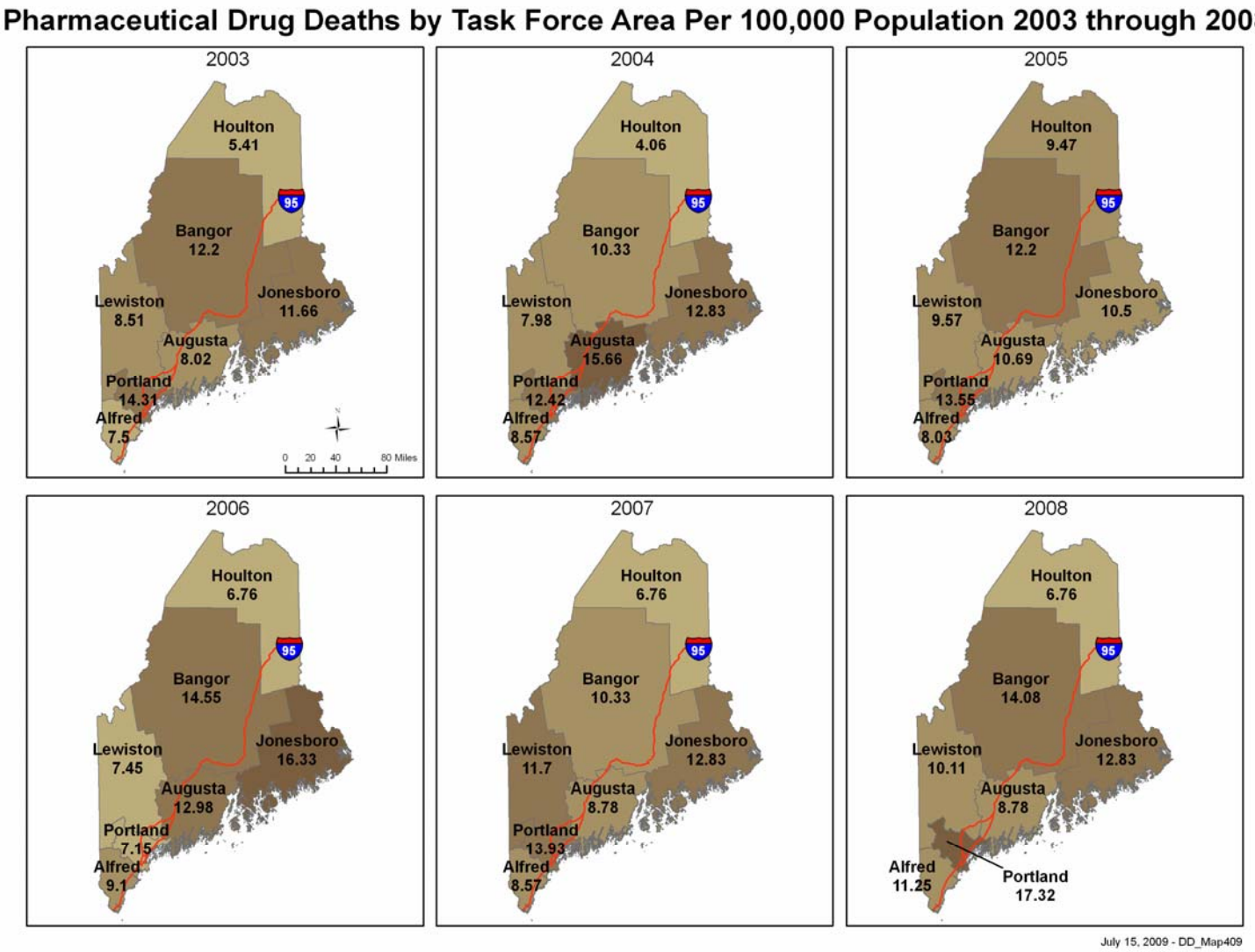


FIGURE 25. PHARMACEUTICAL DRUG DEATHS PER 100,000 POPULATION BY MDEA TASK FORCE AREAS, 2003-2008

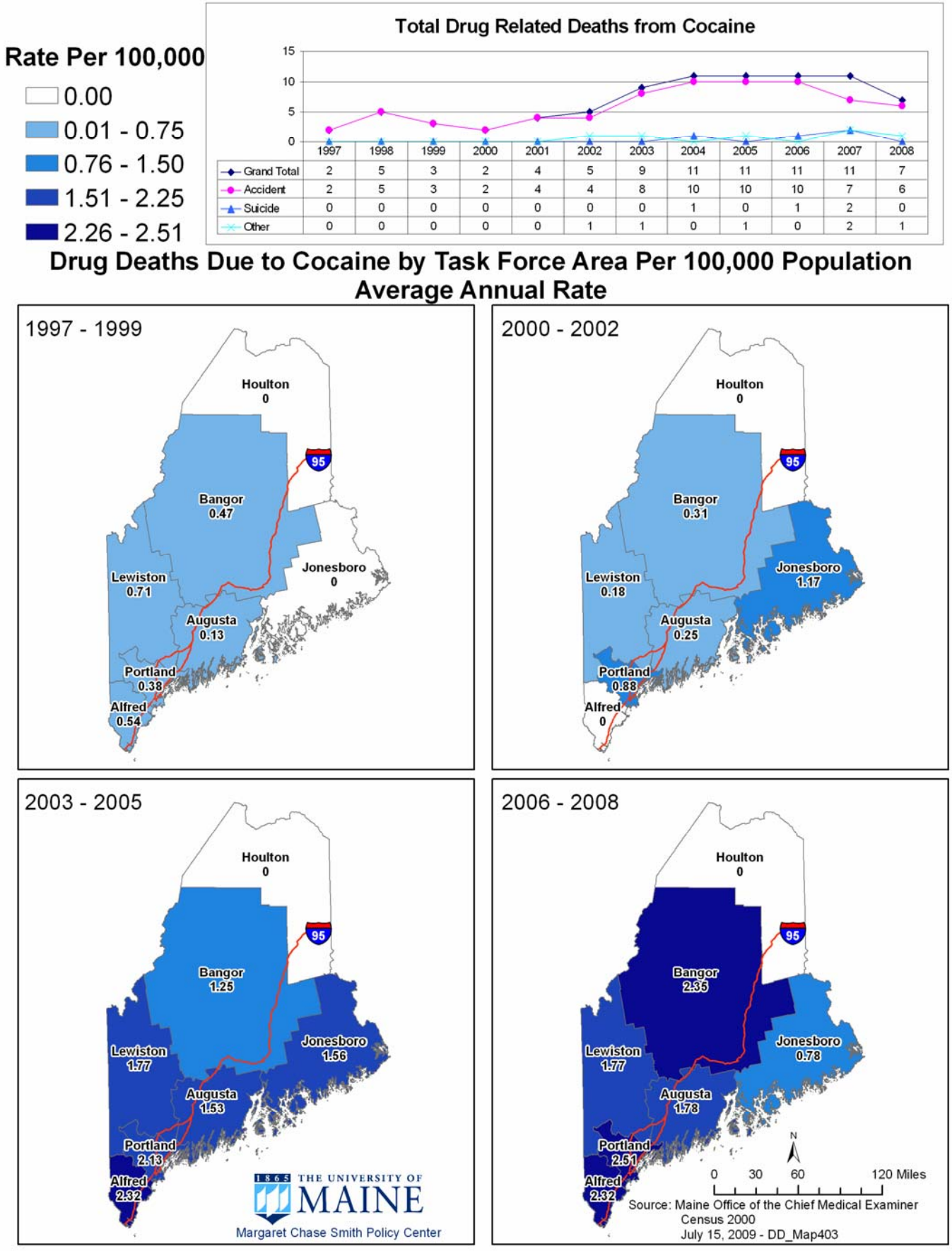


FIGURE 26. COCAINE DEATHS PER 100,000 POPULATION BY MDEA TASK FORCE AREAS

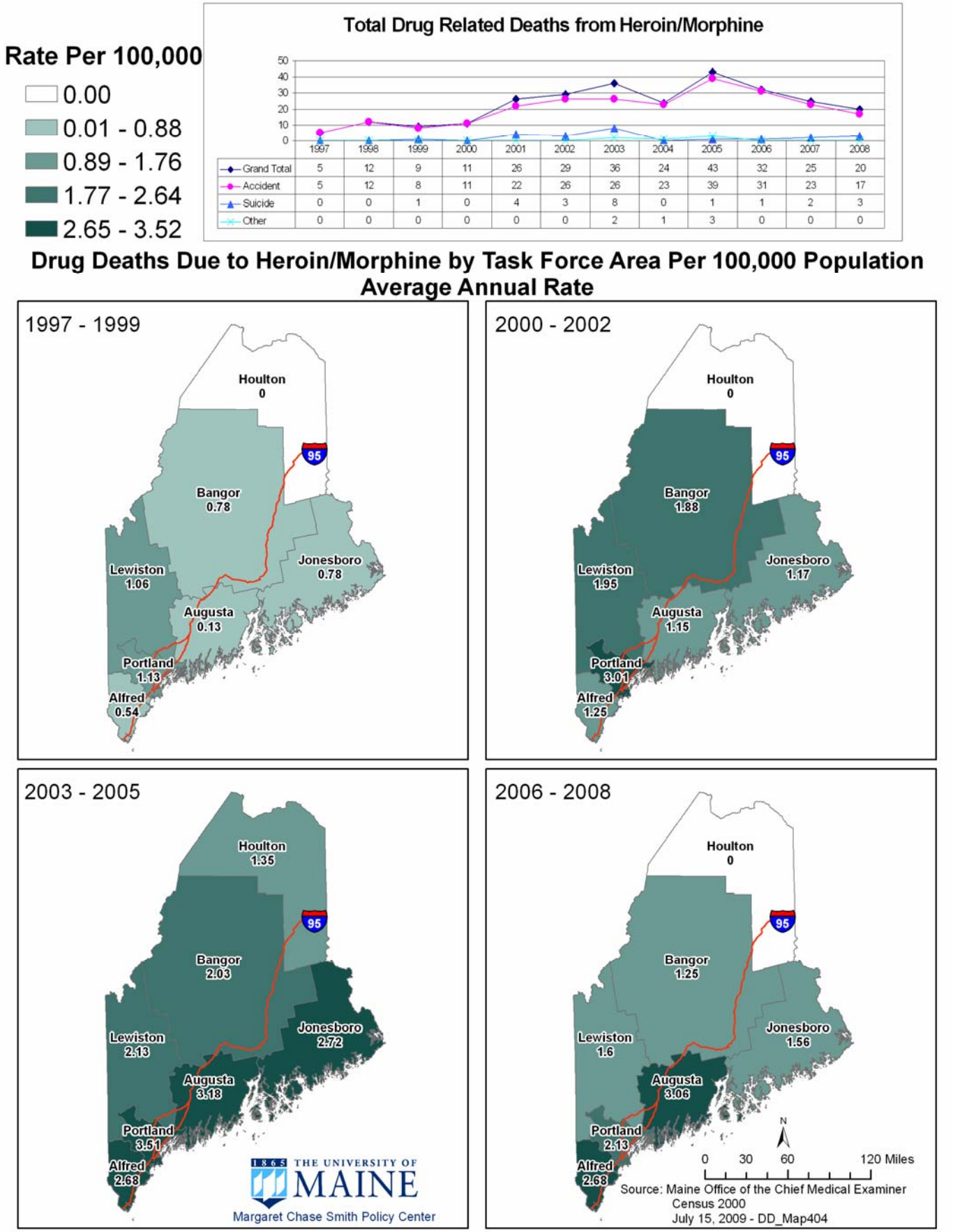


FIGURE 27. HEROIN/MORPHINE DEATHS PER 100,000 POPULATION BY MDEA TASK FORCE AREAS, 1997-2008

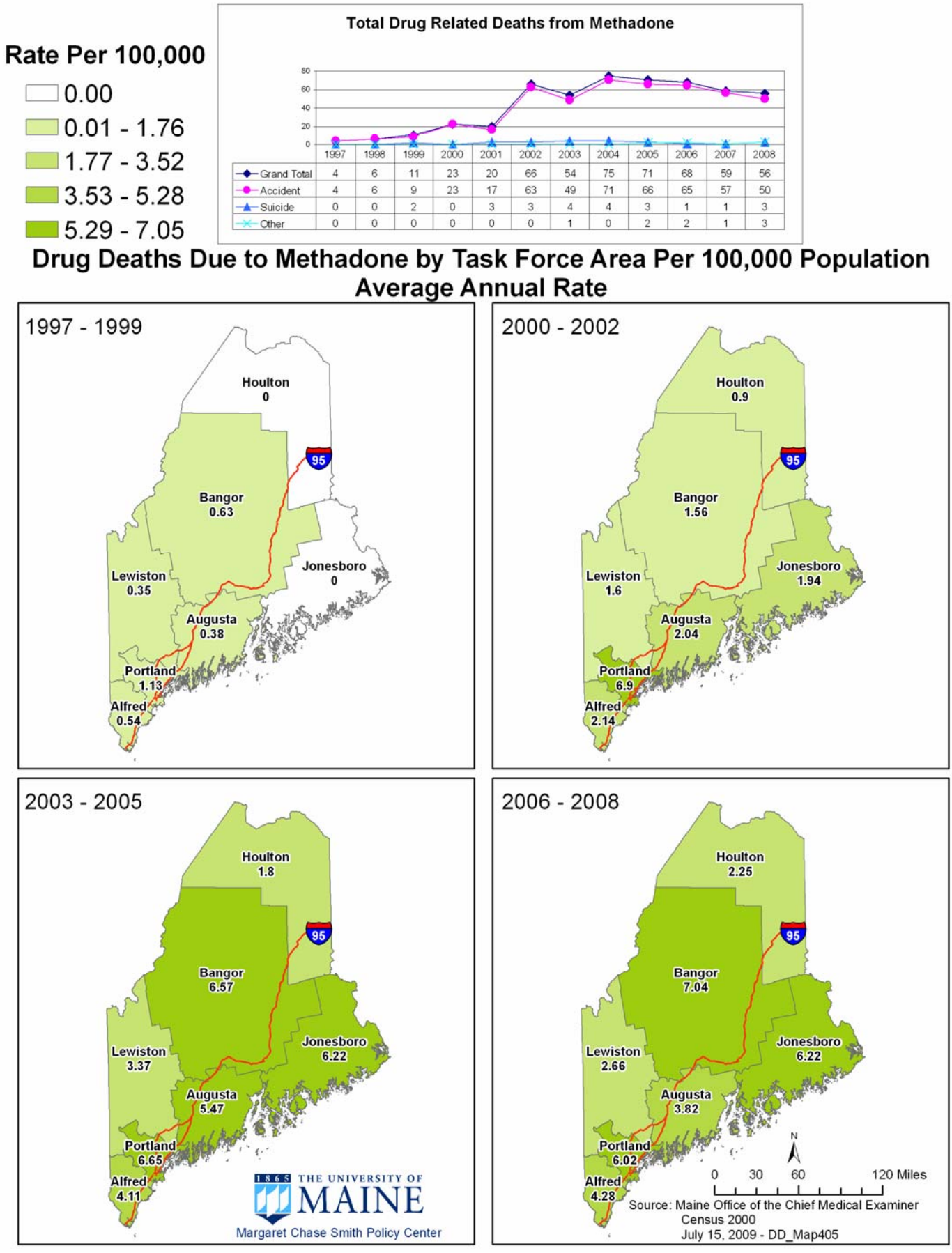


FIGURE 28. METHADONE DEATHS PER 100,000 POPULATION, 1997-2008