



## **Geographic representation and analysis of poison call data**

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Professional & Continuing Education  
University of Washington

# Washington Poison Center Project

- **About the Poison Center**
- **Our Project**
- **Making a Difference**



# Washington Poison Center



Washington



# Washington Poison Center



**What they provide:** Immediate, free, expert, and confidential treatment assistance on the telephone in the case of exposure to poisonous, hazardous, or toxic substances

**Who answers calls:** Nurses, pharmacists, and poison specialists with clinical expertise in poisonings and drug exposures

**Who they serve:** Everyone in Washington State

# Washington Poison Center

**\$12M** per year  
saved in unnecessary  
hospital visits

Over  
**60K** calls  
answered  
per year

**60%** of callers  
would have visited  
the ER or called 911

Over **50%** of calls  
concern a child  
0-5 years old

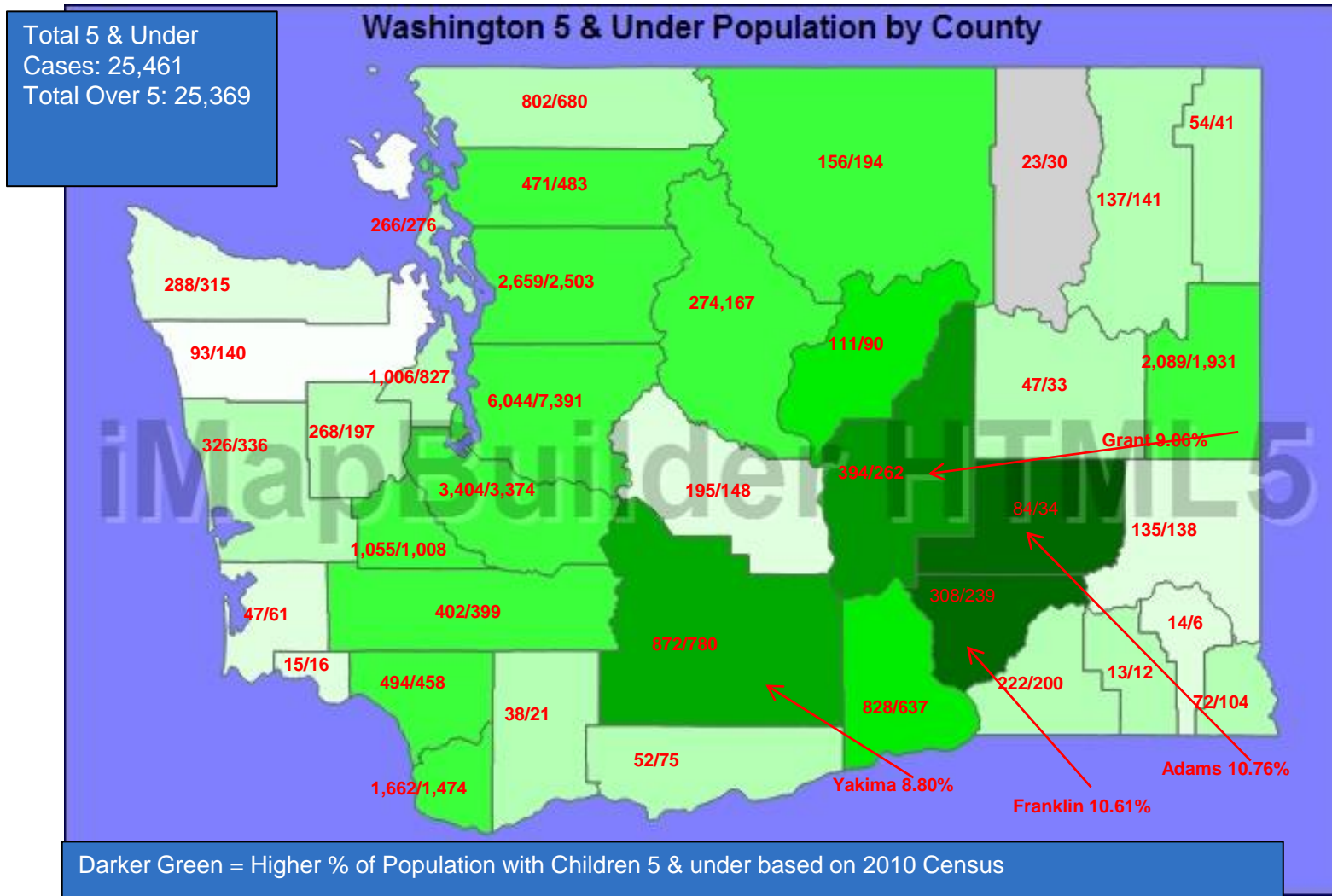
# What's the Problem?



**Government  
funding  
could  
disappear**



# How Can GIS Help?



*We did not make this map!*

# Project Overview





# Project Overview

## **The poison center needs maps to demonstrate:**

- Their knowledge & expertise
- A strong need for their services

## **The poison center wants maps that let them:**

- See geographic patterns
- Monitor call-center operations

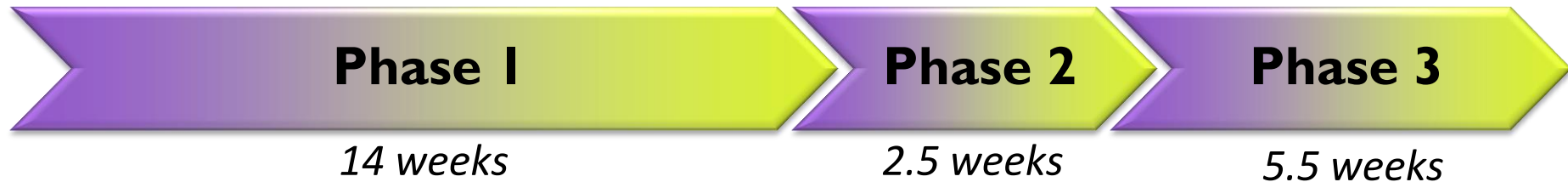
# Project Approach & Timeframe

## Student Problem:

We're learning as we go. What can we commit to?

## Solution:

Complete the project in phases.

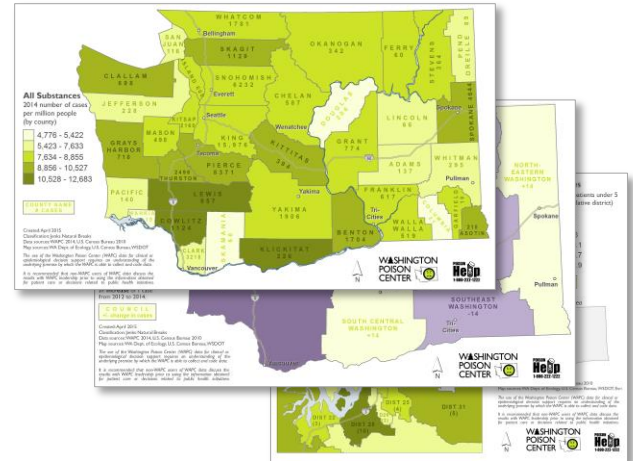


Planning

Execution

# Poison Center Project: Phase One

|         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         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549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 |
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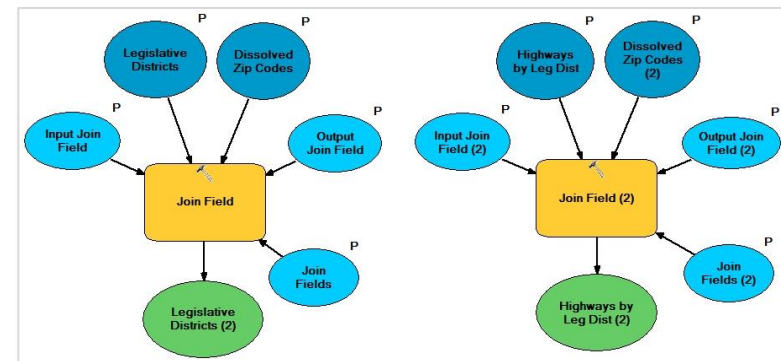
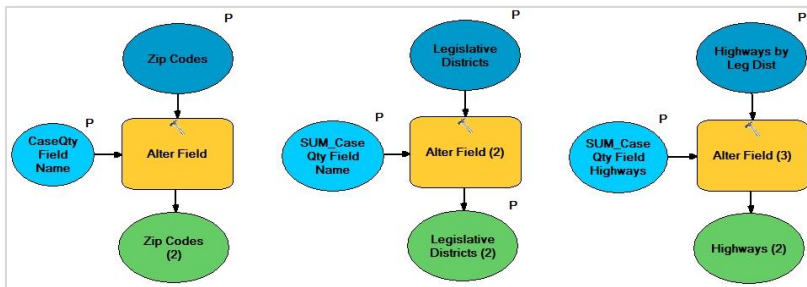
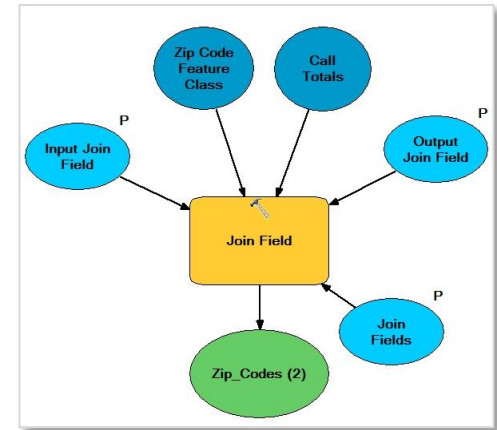
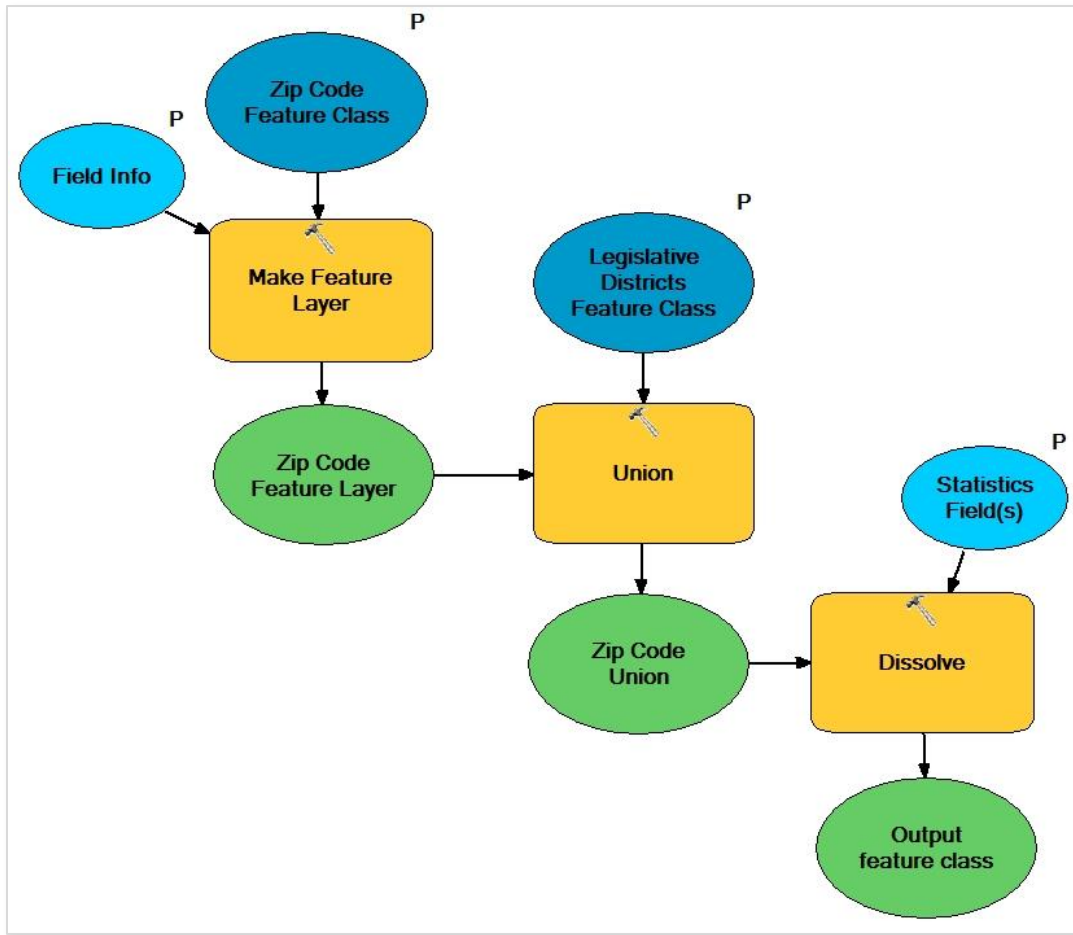
# One-time data export

# Data transformation/analysis

# ~100 data tables

# 73 static maps

# Geoprocessing with Model Builder

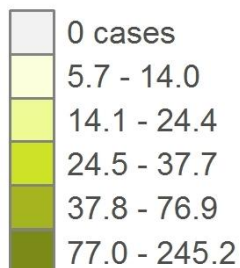




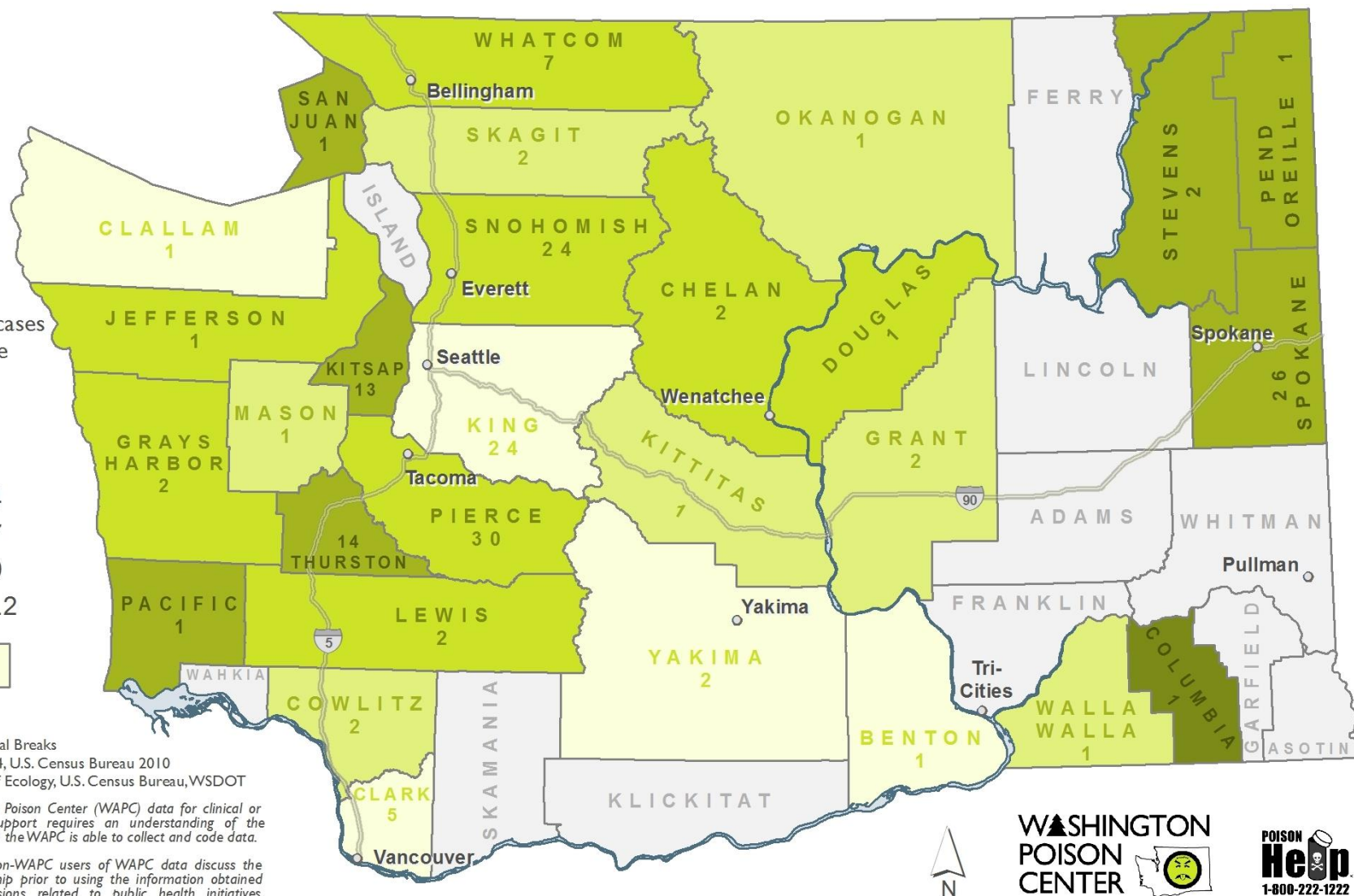
# E-Cigarettes: 2014 Cases

## E-Cigarettes

2014 number of cases  
per million people  
(by county)



COUNTY NAME  
# CASES



Created: April 2015

Classification: Jenks Natural Breaks

Data sources: WAPC 2014, U.S. Census Bureau 2010

Map sources: WA Dept. of Ecology, U.S. Census Bureau, WSDOT

The use of the Washington Poison Center (WAPC) data for clinical or epidemiological decision support requires an understanding of the underlying premise by which the WAPC is able to collect and code data.

It is recommended that non-WAPC users of WAPC data discuss the results with WAPC leadership prior to using the information obtained for patient care or decisions related to public health initiatives.

WASHINGTON  
POISON  
CENTER

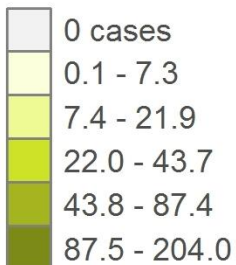


POISON  
Help  
1-800-222-1222

# Marijuana: 2014 Cases (Pediatric Patients)

## Marijuana

2014 number of cases with patients under 18 per million people (by legislative district)

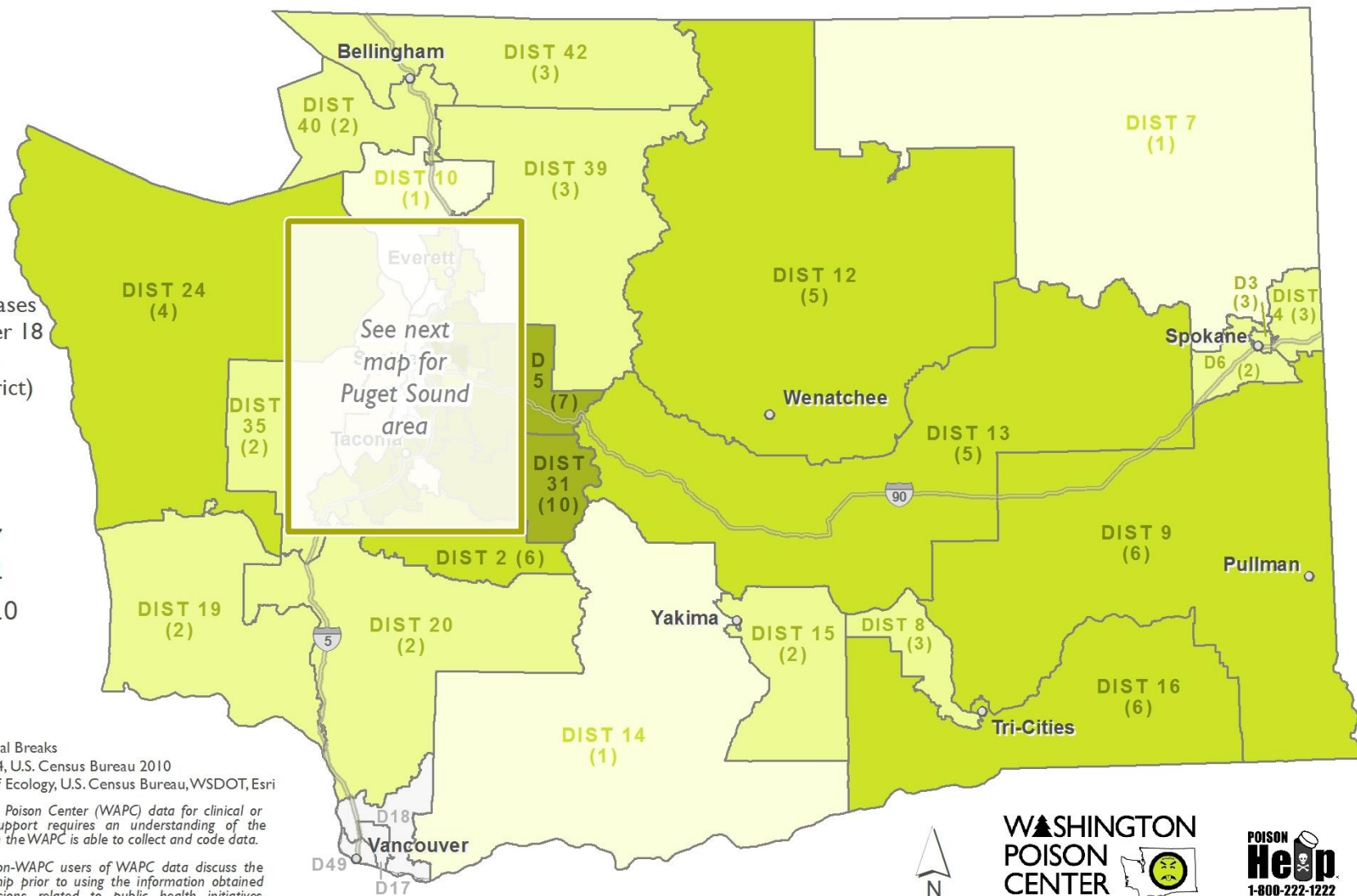


**DISTRICT**  
(# CASES)

Created: April 2015  
Classification: Jenks Natural Breaks  
Data sources: WAPC 2014, U.S. Census Bureau 2010  
Map sources: WA Dept. of Ecology, U.S. Census Bureau, WSDOT, Esri

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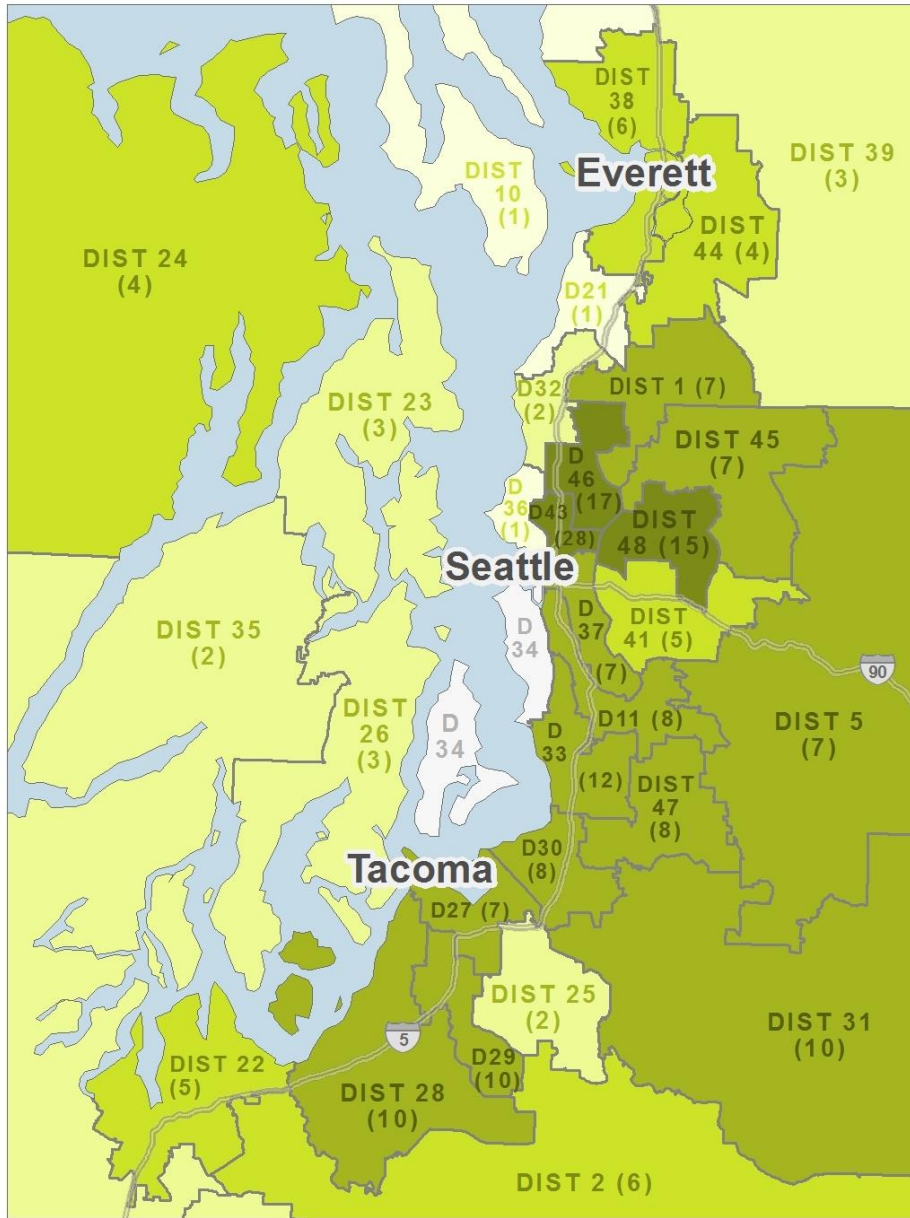


**WASHINGTON**  
**POISON**  
**CENTER**



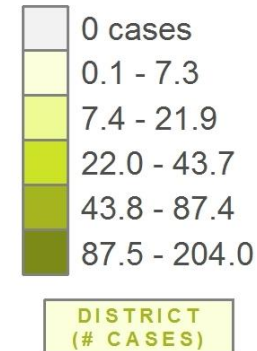
**POISON**  
**Help**  
1-800-222-1222

## Marijuana: 2014 Cases (Pediatric Patients)



## Marijuana

2014 number of cases with patients under 18  
per million people (by legislative district)



*Puget Sound area*



Scale: 1:800,000

Created: April 2015

Classification: Jenks Natural Breaks

Data sources: WAPC 2014, U.S. Census Bureau 2010

Map sources: WA Dept. of Ecology, U.S. Census Bureau, WSDOT, Esri

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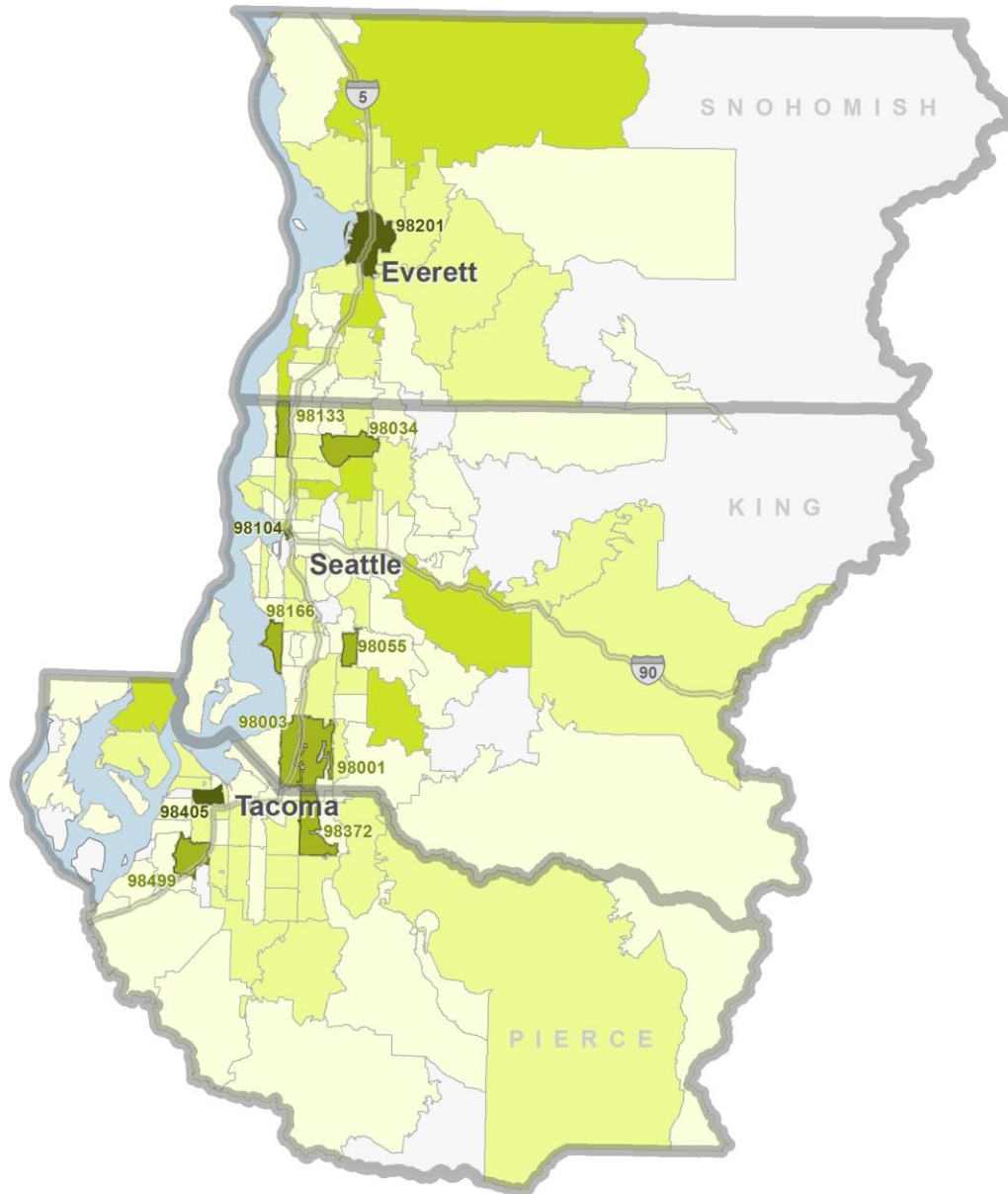
WASHINGTON  
POISON  
CENTER



**POISON**  
**Help**  
1-800-222-1222

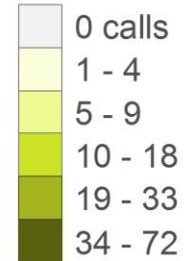


# Prescription Painkillers: 2014 Cases



## Prescription Painkillers

2014 number of calls  
(by zip code)



Snohomish, King, & Pierce Counties



Scale: 1:1,000,000

Created: April 2015

Classification: Jenks Natural Breaks

Data sources: WAPC 2014, U.S. Census Bureau 2010

Map sources: WA Dept. of Ecology, U.S. Census Bureau, WSDOT

*The use of the Washington Poison Center (WAPC) data for clinical or epidemiological decision support requires an understanding of the underlying premise by which the WAPC is able to collect and code data.*

*It is recommended that non-WAPC users of WAPC data discuss the results with WAPC leadership prior to using the information obtained or patient care or decisions related to public health initiatives.*



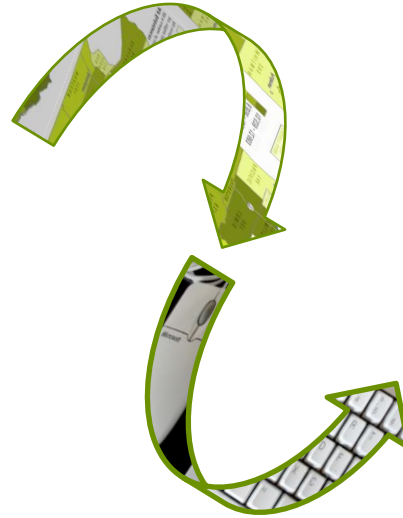
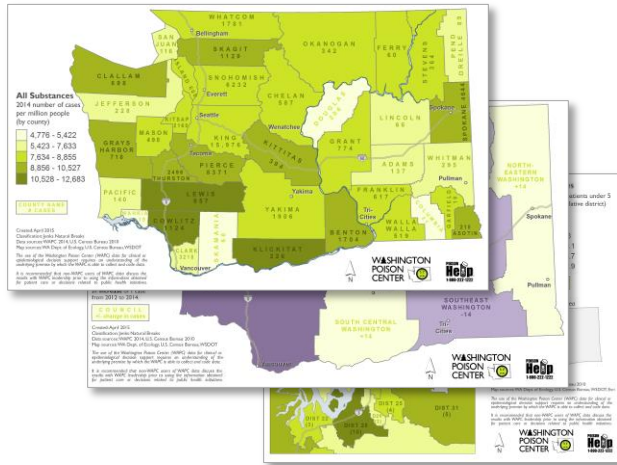
**WASHINGTON  
POISON  
CENTER**



**POISON  
Help**  
1-800-222-1222



# Poison Center Project: Phase Two



- 5 animated time-lapse maps
- ArcGIS Online map & web app

# Time-Lapse Map

**All Substances:** Number of cases by month (cumulative)

## August 2014



The use of the Washington Poison Center (WAPC) data for clinical or epidemiological decision support requires an understanding of the underlying premise by which the WAPC is able to collect and code data.

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Created: April 2015  
Classification: Jenks Natural Breaks

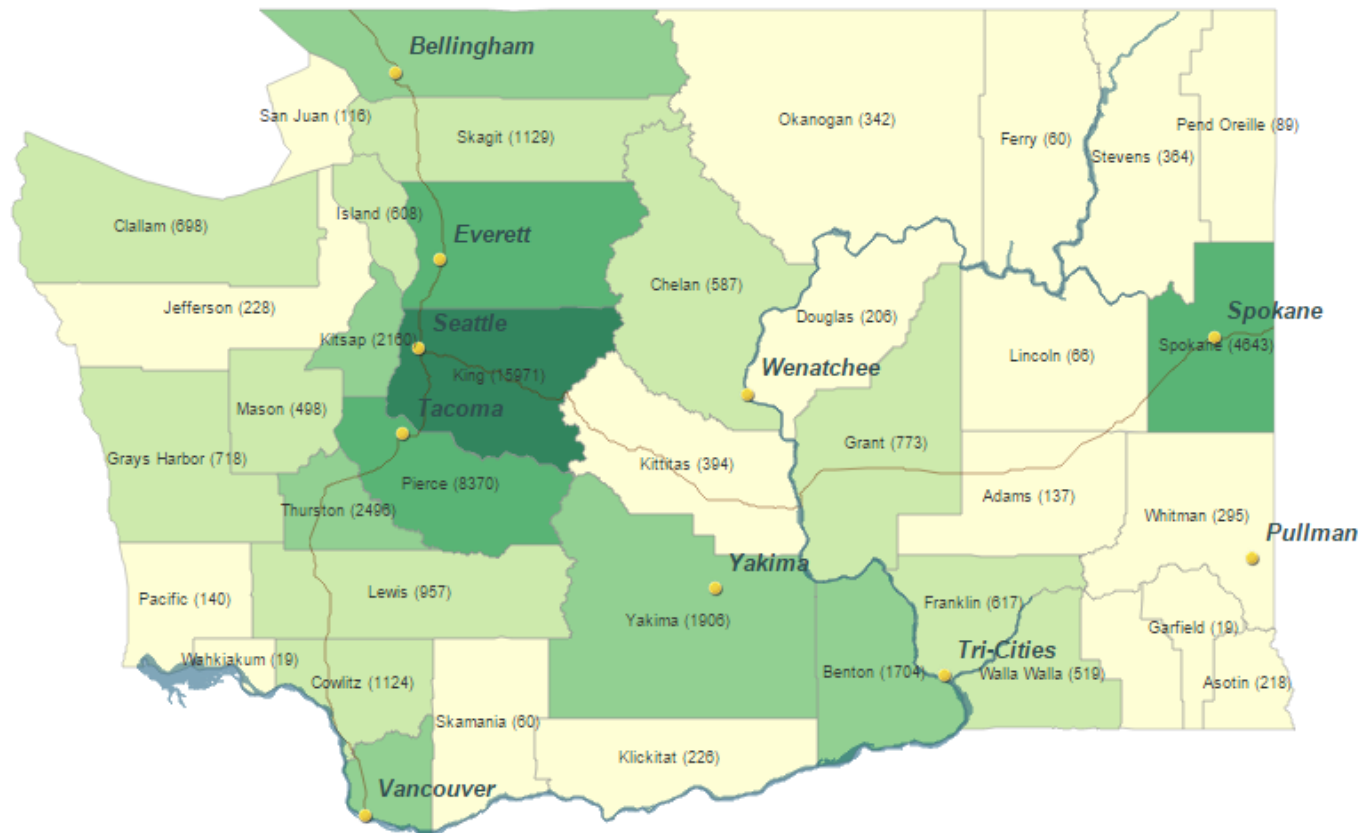
WASHINGTON  
POISON 

## POISON Help

# ArcGIS Online

2014 Exposures

All



POWERED BY  
**esri**

Human Exposures Grand Total

59,709

Adhesives/glues

280

Alcohols

1,362

Analgesics

6,552

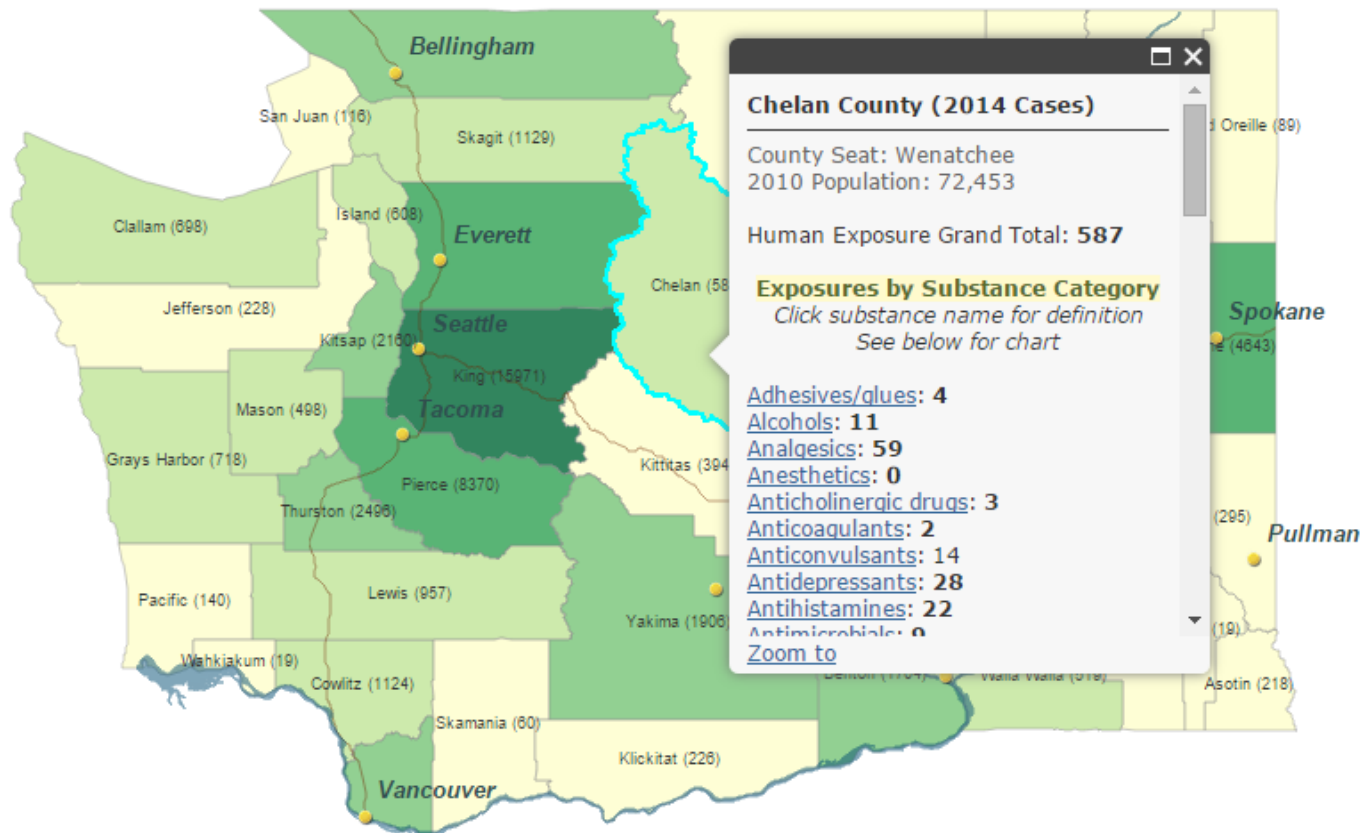


# ArcGIS Online



2014 Exposures

All



Human Exposures Grand Total

59,709

Adhesives/glues

280

Alcohols

1,362

Analgesics

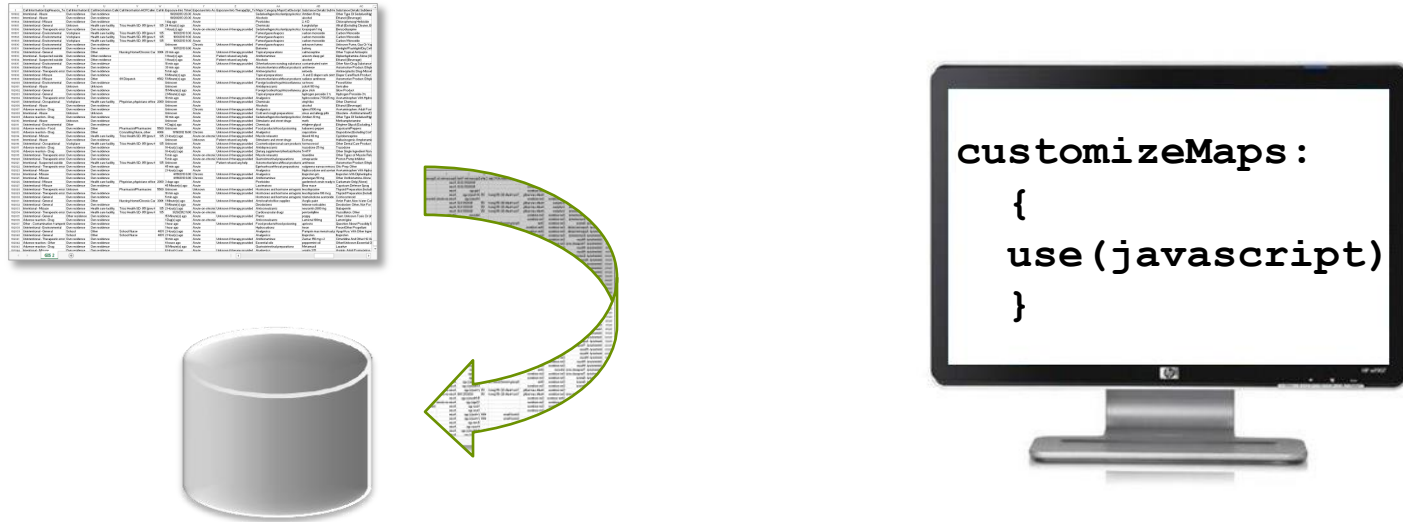
6,552



POWERED BY  
**esri**



# Poison Center Project: Phase Three



- Data automation
- Real-time call center dashboard
- Fully customized online map
- Final documentation & hand off

## Lessons Learned

- File and table organization is important.
- Real-world data is not class exercise data.
- It always takes longer than you think.

**Not everything we learned was serious...**

# Weapons of Mass Destruction?

- 
- ☢ candy
  - ☢ cholesterol
  - ☢ de icer salt
  - ☢ gatorade
  - ☢ green pill
  - ☢ pesticide?
  - ☢ rat poison
  - ☢ Ritalin
  - ☢ tea kettle sediment
  - ☢ TV remote control
  - ☢ unknown spider
  - ☢ unknown substance possibly hot sauce
  - ☢ unknown substance that was not milk
  - ☢ white rabbit
  - ☢ witches brew made by kids - unknown substances
  - ☢ yellow sticky material



# Making a Difference

## WASHINGTON POISON CENTER



WASHINGTON  
POISON  
CENTER

- 1-800-222-1222
- We're for everyone
- We're free
- We're confidential
- We have interpretation services (including TTY) with over 150 languages
- Experts/medical professionals answer the phones
- Consults by Board Certified Toxicologists Any Time
- We're always open 24/7/365



PRE-INSURV

# of concussions in US ?

Incidence of concussions!

Return to concussions

only

giving

# Making a Difference

## Our maps presented to:

State legislators

Dept of Social & Health Services

Dept of Health

State Liquor Control Board

State PTA

300 media contacts

Health care providers

Newsletter subscribers



# Toxic Trends Report





# Annual Report

## SUPPORTING HEALTH CARE

*in Washington State*

An estimated \$12 to 30 million in healthcare costs were saved in Washington by using the WAPC to treat poison and drug cases at the site the exposure occurred, rather than in a hospital ER, urgent care, or doctor's office.

- ♦ Poisoning is the leading cause of accidental death in the U.S.
- ♦ For every dollar spent on poison center services, \$13.39 is saved in medical expenses<sup>1</sup>.
- ♦ WAPC staff provide emergency poison treatment advice that can prevent unnecessary hospital visits ranging from young children to seniors.
- ♦ WAPC trains future physicians, pharmacists and paramedics in poison and drug exposure management.

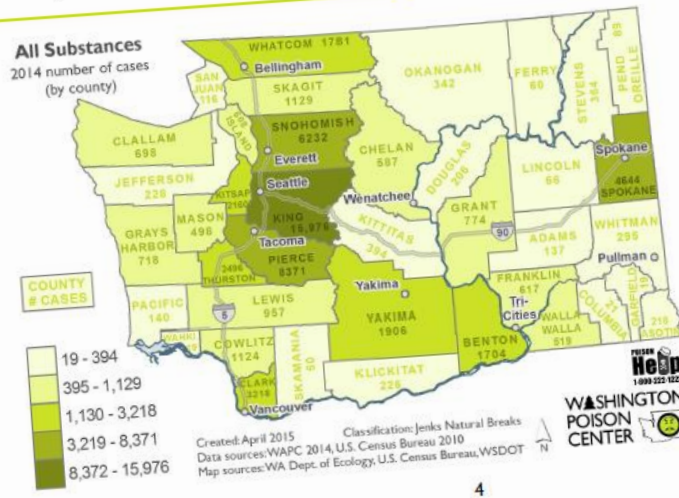
<sup>1</sup> The Lewin Group, Inc., comp. [http://www.aapcc.org/Final\\_Report\\_on\\_the\\_Value\\_of\\_the\\_Poison\\_Center\\_System\\_Publication\\_no\\_DM\\_#547339](http://www.aapcc.org/Final_Report_on_the_Value_of_the_Poison_Center_System_Publication_no_DM_#547339). American Association of Poison Control Centers (AAPCC), 26 Sept. 2012. Web. 14 Apr. 2015.

*"My husband accidentally took a double dose of his evening medications. I was very glad I made the right call, literally, in calling the Poison Center."  
(Senior Adult)*

**Top 10 exposures in children under 6 years of age:**

1. Cosmetics/Personal Care Products
2. Cleaning Substances (Household)
3. Foreign Bodies/Toys
4. Pain Medications
5. Skin Creams & Ointments
6. Vitamins
7. Plants
8. Dietary Supplements
9. Antihistamines
10. Pesticides

Call Volume  
by County





# Making a Difference

“It’s hard to imagine creating public awareness without having these maps concerning key health concerns during this legislative session.”

*Carrie Ulvestad (Executive Director, WAPC)*



# Making a Difference

WAPC has a valuable repository of exposure data that was not being fully utilized. GIS mapping is tremendously better for presenting this information in ways that resonate directly with state agencies, health care providers and state leaders.

*Carrie Ulvestad (Executive Director, WAPC)*



# Washington Poison Center: 1-800-222-1222

BE READY FOR POISON  
TWENTY-FOUR SEVEN!



Call Mr. Yuk at 1-800-222-1222

**In Oregon?**

Call the same  
number  
to reach the  
Oregon Poison  
Center.



*2015 poster contest winner Maia Seeley, age 10 (Edmonds, WA)*

**Kate Leroux**

kate@mynameiskate.com

&

**Jane Park**

aeonjane@gmail.com