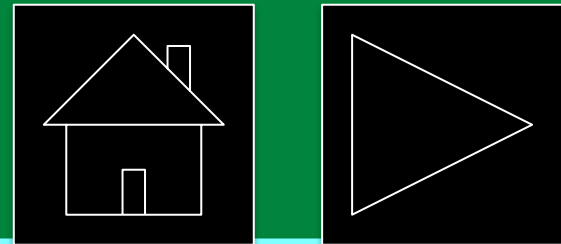


Using SAS® for a Data Visualization Study of the Distribution of Same-Sex Couples by State as Marriage Laws Change

Bula Ghose, Health and Human Services, Washington D.C

Susan G. Queen, Health and Human Services, Washington D.C

Joan Turek- Health and Human Services, Washington D.C



INTRODUCTION

The animation tool within SAS GMAP, SAS 9.4, works well when developing visualizations on how state laws addressed same-sex marriage (SSM) and how it changes before the Supreme Court decision in 2015. Our study uses data from the Pew Research Center, available at <http://www.pewforum.org/2015/06/26/same-sex-marriage-state-by-state/>, with the data spanning from 2004 through 2014. Court decisions regarding SSM are complicated, therefore, for the purpose of this e-poster, both same-sex marriages and civil unions are depicted as legal. Similarly, we have considered and displayed a variety of specific legal bans as referenced in the literature. Additional categories are presented to show states in which same-sex marriages were neither considered legal nor banned.

To emphasize the value of animation, the presentation compares the data depicted in a static map to the data displayed via the dynamic map. When creating the animated map, the same code can be used in each year of the state level American Community Survey (ACS) one year estimates, resulting in a year-by-year display of the percentage of same sex households who are married each year. The visualization using the animated map provides clear and comprehensive data, and shows how policies about same-sex marriage changed over time.

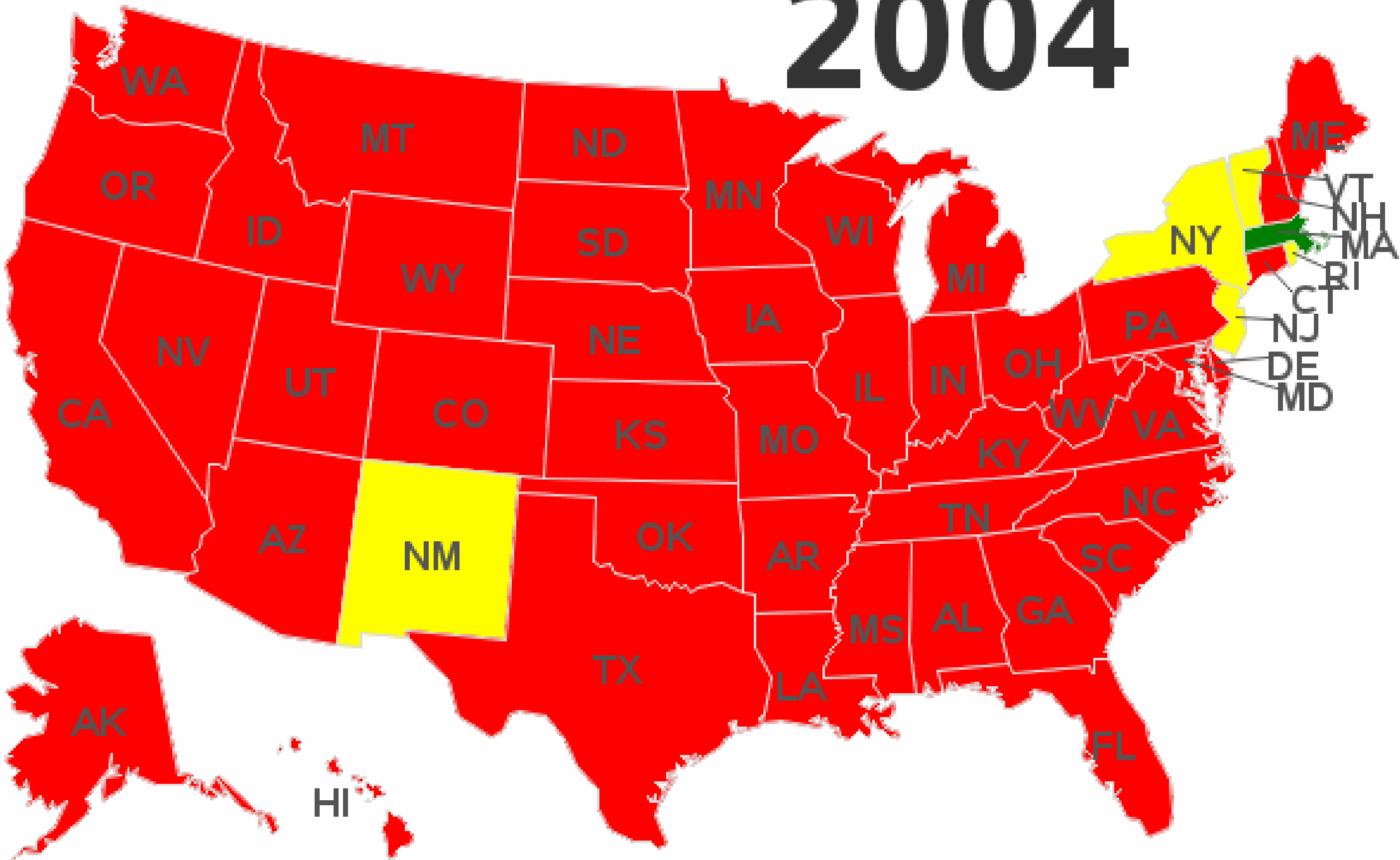
ABSTRACT

Marriage laws have changed in 38 states, including the District of Columbia, permitting same-sex couples to marry since 2004. However, since 1996, 13 states have banned same-sex marriages, some of which are under legal challenge. A U.S. animated map, made using the SAS® GMAP procedure in SAS® 9.4, shows the changes in the acceptance, rejection, or undecided legal status of this issue, year-by-year. In this study, we also present other SAS data visualization techniques to show how concentrations (percentages) of married same-sex couples and their relationships have evolved over time, thereby instigating changes in marriage laws. Using a SAS GRAPH display, we attempt to show how both the total number of same-sex-couple households and the percent that are married have changed on a state-by-state basis since 2005. These changes are also compared to the year in which marriage laws permitting same-sex marriages were enacted, and are followed over time since that year. It is possible to examine trends on an annual basis from 2005 to 2013 using the American Community Survey one-year estimates. The SAS procedures and SAS code used to create the data visualization and data manipulation techniques are provided.

Paper Number--1781

Disclaimer: The views expressed in this report are those of the authors and do not necessarily represent the views of the Department of Health and Human Services or the Office of the Assistant Secretary for Planning and Evaluation.

Legal Status of Same Sex Marriage 2004 to 2014 2004



- 6th Circuit Court upholds bans in certain states
- Federal Court rulings make same-sex marriage legal
- Legalized at the State level
- Neither Legal nor Banned
- State Constitutional Ban
- State Law allows Civil Unions
- State Statute Ban
- Supreme Court declines to review cases on State Bans

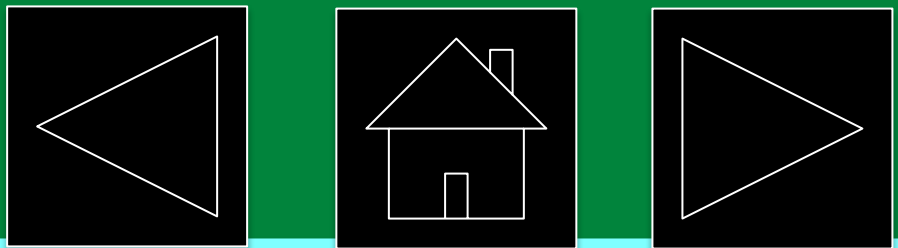
Acknowledgement: SAS Institute: Robert Allison/Ted Durie.

Using SAS® for a Data Visualization Study of the Distribution of Same-Sex Couples by State as Marriage Laws Change

Bula Ghose, Health and Human Services, Washington D.C

Susan G. Queen, Health and Human Services, Washington D.C

Joan Turek- Health and Human Services, Washington D.C



SAS ANIMATION CODE (Click Slide to View Code.)

1

```
/******  
*****  
  
Reading raw data and create SAS data sets; raw data maybe available upon  
request  
*****  
*****/  
libname ssex "libref ";  
%let name=ssm_anim&sysdate;  
filename odsout '.';  
  
PROC IMPORT OUT=ssex.ssex DATAFILE="location of your input excel file"  
  DBMS= EXCELCS  REPLACE;  
RUN;  
  
proc sort data=ssex.ssex out=ssex;  
  by statecode stateno;  
run;  
proc transpose data=ssex out=ssex2;  
  by statecode stateno;  
  var _004 _005 _006 _007 _008 _009 _010 _011 _012 _013 _014;  
run;  
  
data ssex3 (drop = stateno _label_ _name_ rename=(col1=legal_status));  
  set ssex2;  
  year=.;  
  year=_label_;  
run;
```

2

```
proc sort data=ssex3 out=ssex4;  
  by year statecode;  
run;  
/******  
*****  
  
Annotate dataset for state labels  
These x and y locations are hard-coded, and only work with maps.us...  
*****  
*****/  
data maplabel;  
  set maps.uscenter(where=(fipstate(state) not in ('PR' 'DC')));  
  statecode=fipstate(state);  
  * move Hawaii's label slightly *;  
  if statecode='HI' then  
  
do;  
  x=x-.01;  
  y=y-.01;  
end;  
length function $8;  
retain flag 0;  
xsys='2';  
ysys='2';  
hsys='3';  
when='a';  
function='label';
```

3

```
color='gray55';  
style="albany amt/bold";  
position='5';  
size=2.8;  
text=trim(left(statecode));  
if ocean='Y' then  
do;  
  position='6';  
  output;  
  function='move';  
  flag=1;  
end;  
else if flag=1 then  
do;  
  function='draw';  
  size=.25;  
  flag=0;  
end;  
output;  
run;  
  
proc format;  
value $legfmt  
  "CC Ban"   = "6th Circuit Court upholds bans in certain states"  
  "FC Legal" = "Federal Court rulings make same-sex marriage legal"  
  "Legal"    = "Legalized at the State level"
```

Using SAS® for a Data Visualization Study of the Distribution of Same-Sex Couples by State as Marriage Laws Change

Bula Ghose, Health and Human Services, Washington D.C

Susan G. Queen, Health and Human Services , Washington D.C

Joan Turek- Health and Human Services, Washington D.C



SAS ANIMATION CODE CONTINUED (Click Slide to View Code.)

4

```
"NLNB"    = "Neither Legal nor Banned"
"SC Ban"   = "State Constitutional Ban"
"SL CU"    = "State Law allows Civil Unions"
"SS Ban"   = "State Statute Ban"
"Supreme Ct"= "Supreme Court declines to review cases on State Bans"
;
run;
/*****
*****
Animation code starts here
*****
*****/
options dev=sasprtc printerpath=gif animduration=2 animloop=0
animoverlay=no animate=start center;

ODS LISTING CLOSE;
ODS HTML path=odsout body="&name..htm"
  (title="Same Sex Marriage in the US")
  style=sasweb;
goptions gunit=pct htitle=5 htext=3.0 ftitle="albany amt/bold" ftext="albany
amt" ctext=gray33;
```

5

```
options nobyline;
/*****
*****
Select various colors to show animation for
legal<green/blue>/banned<red>/neither legal nor band categories<yellow>
Make sure format is in alphabetic order
*****
*****/
pattern1 v=s c=green;
pattern2 v=s c=blue;
pattern3 v=s c=green;
pattern4 v=s c=yellow;
pattern5 v=s c=red;
pattern6 v=s c=green;
pattern7 v=s c=red;
pattern8 v=s c=cxCDB5CD;

/*****
*****
add a little space to left and right of map
*****
*****/

title2 a=90 h=2 ' ';
title3 a=-90 h=2 ' ';
```

6

```
legend1 label=none position=(bottom) shape=bar(.15in,.15in) value=(j=l);
title1 ls=1.5 "Legal Status of Same Sex Marriage 2004 to 2014 ";

proc gmap data=ssex4 anno=maplabel
  map=maps.us (where=(statecode not in ('PR')))) all;
  by year;
  id statecode;
  note move=(55,85) height=11 font='albany amt/bold' "#byval(year)";
  choro legal_status / uniform
  cdefault=white coutline=graydd
  legend=legend1
  des=" name="&name";
  format legal_status $legfmt.;
run;

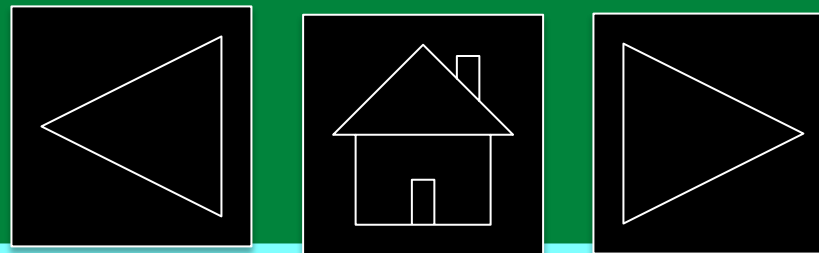
quit;
ODS HTML CLOSE;
ODS LISTING;
```


Using SAS® for a Data Visualization Study of the Distribution of Same-Sex Couples by State as Marriage Laws Change

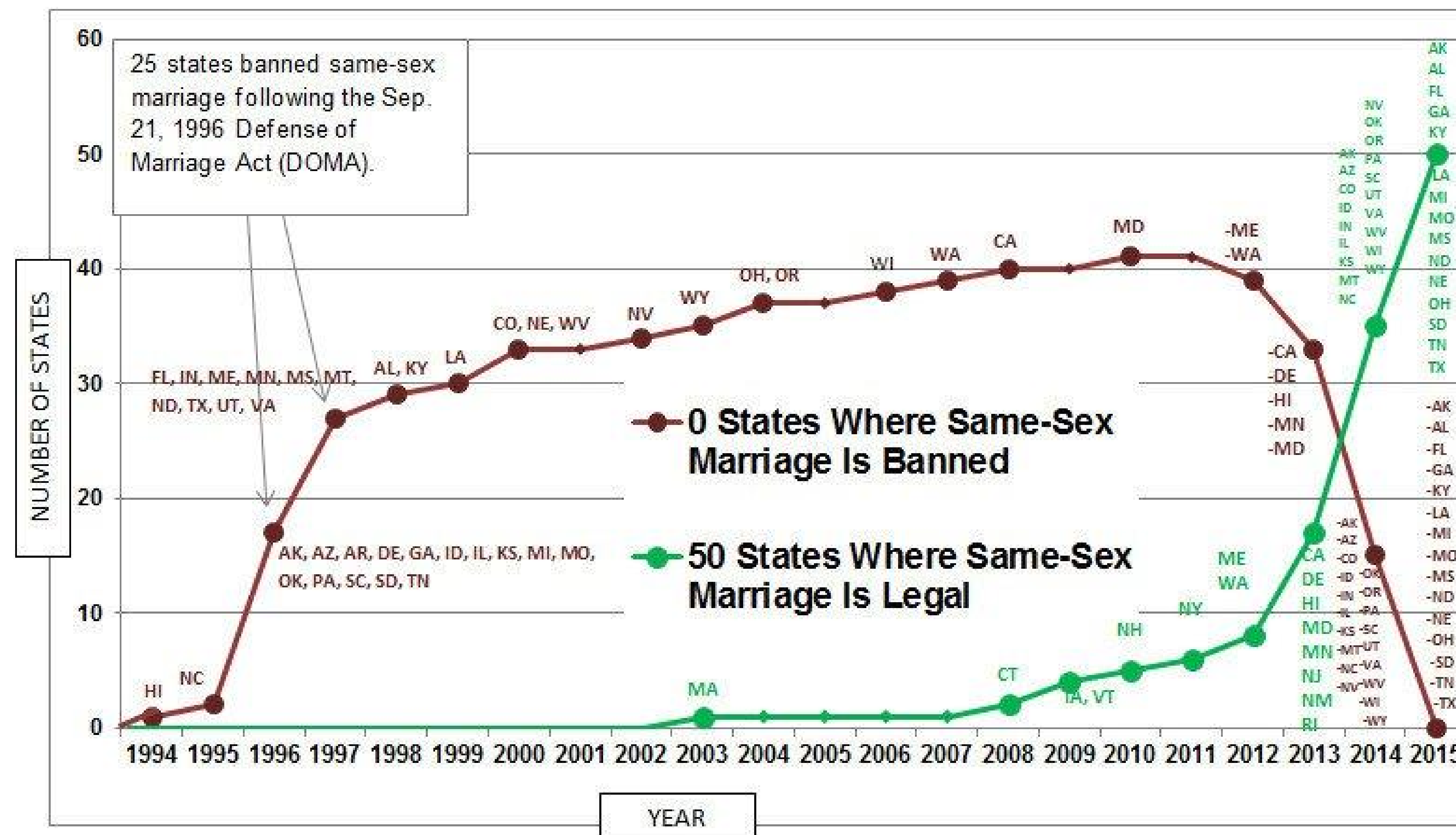
Bula Ghose, Health and Human Services, Washington D.C

Susan G. Queen, Health and Human Services , Washington D.C

Joan Turek- Health and Human Services, Washington D.C



Data Display using STATIC Design



Notes:

- A minus sign before the state indicates that the legal status of gay marriage changed from banned to legal.
- When a state has instituted gay marriage bans multiple times (e.g. by legislative action and then by popular vote), only the most recent ban has been included for each state.
- DC legalized same-sex marriage on Mar. 3, 2010.
- California legalized same-sex marriage on May 15, 2008, but banned it on Nov. 4 of the same year.

Source:

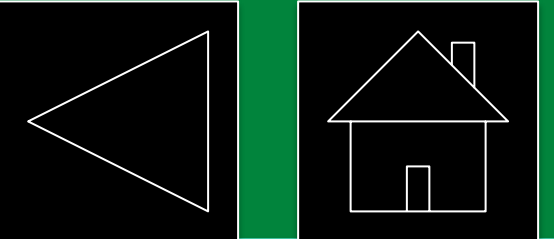
<http://gaymarriage.procon.org/view.resource.php?resourceID=004857>

Using SAS® for a Data Visualization Study of the Distribution of Same-Sex Couples by State as Marriage Laws Change

Bula Ghose, Health and Human Services, Washington D.C

Susan G. Queen, Health and Human Services , Washington D.C

Joan Turek- Health and Human Services, Washington D.C



CONCLUSION

Our study findings support the ability to produce better data visualizations by using the SAS 9.4 animation tool. Our results demonstrate an improvement in the display from the typical static data in a flat format to a more dynamic mapping display that reveals a real-time state-by-state evolution of same sex marriage laws from 2004 through 2014.

CONTACT INFORMATION

Bula Ghose, Social Science Analyst
Department of Health & Human Services
200 Independence Ave, SW
Washington, DC 20201
Bula.ghose@hhs.gov

REFERENCES/AKNOWLEGEMENT

SAS animation Expert:
Robert Allison's site links

Main Website:

<http://www.robslink.com/SAS/Home.htm>

Animation Examples:

<http://www.robslink.com/SAS/democd27/aaindex.htm>

Acknowledgement: SAS Institute: Robert Allison/Ted Durie and SAS Technical team for SAS Graph.

Rashida Dorsey and Suzie BurkeBebee