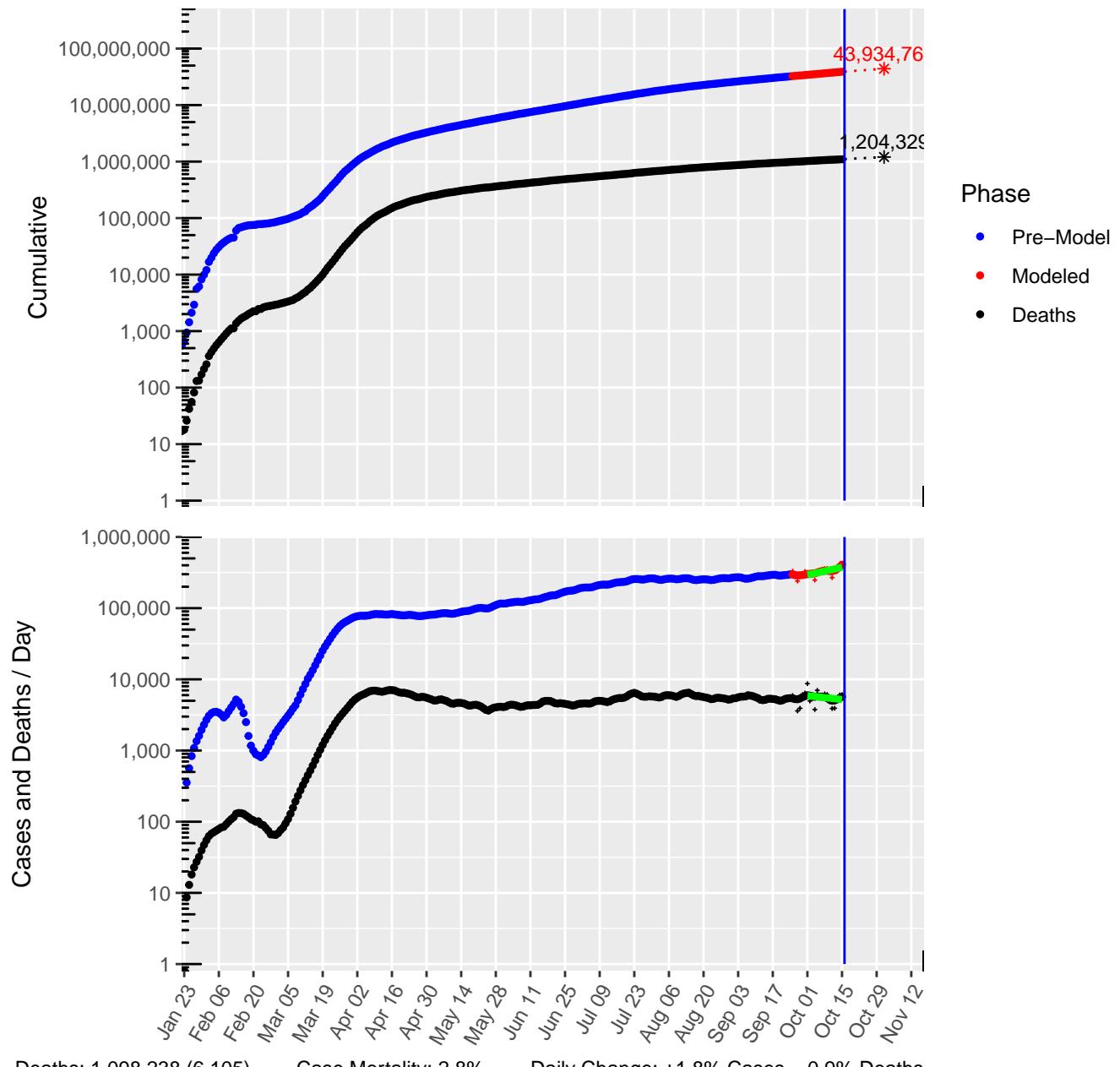
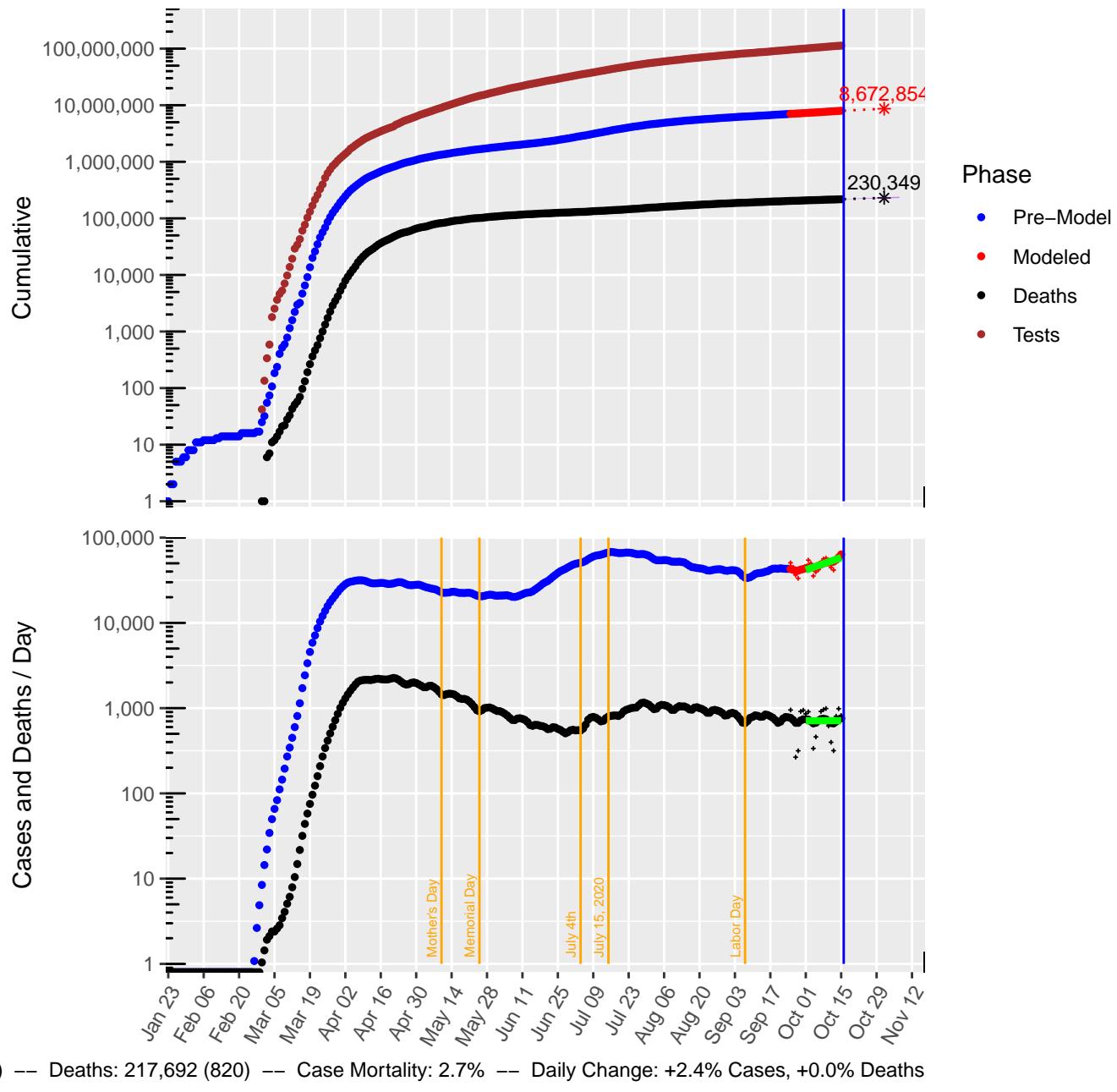


# Worldwide projection as of 2020-10-16

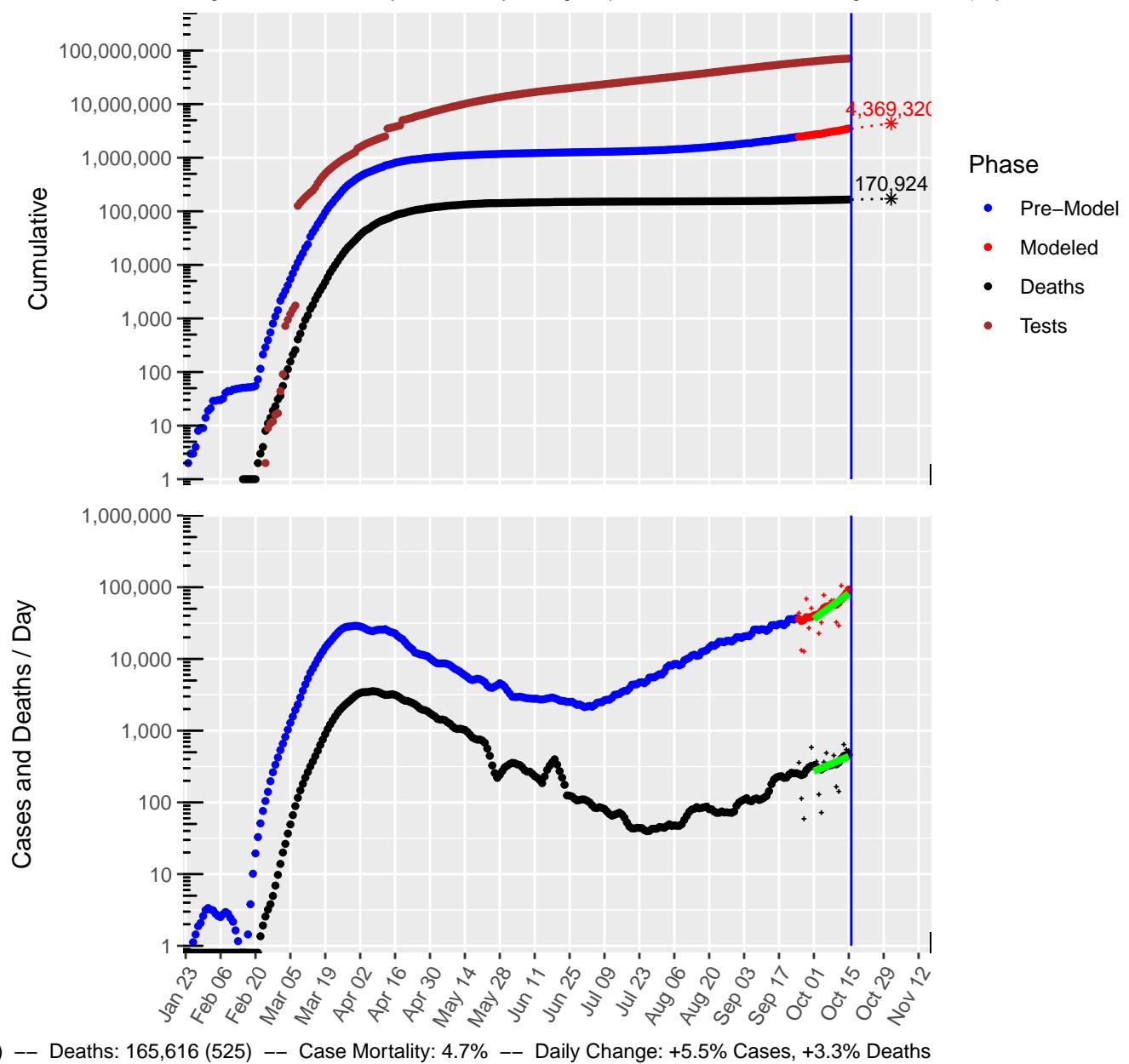


# USA projection as of 2020-10-16



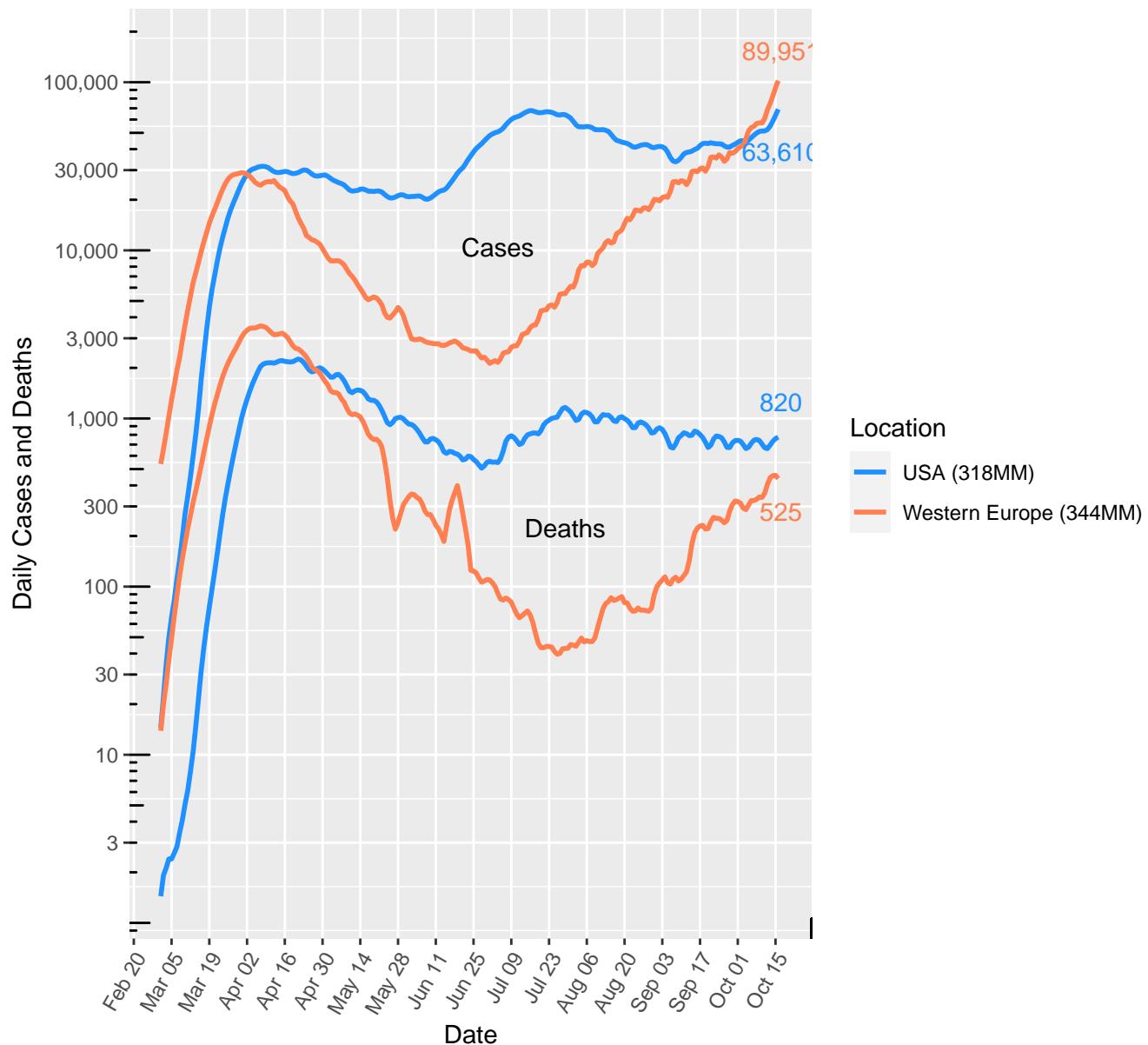
# Western Europe projection as of 2020-10-16

Belgium, France, Germany, Greece, Italy, Portugal, Spain, Netherlands, Luxembourg, and the UK (Population = 344MM)



# Comparison of COVID-19 Cases & Deaths between US & Europe

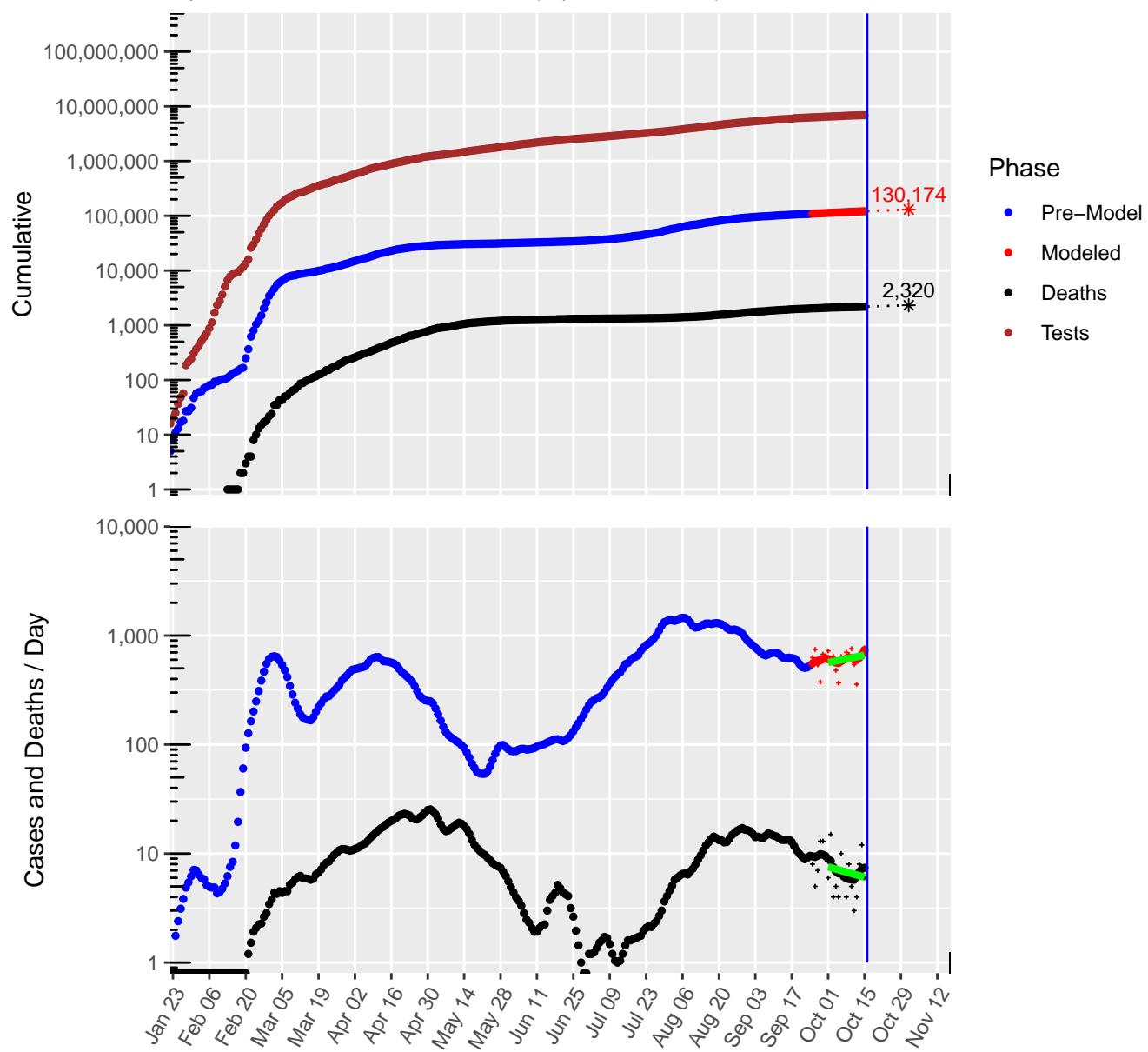
Log plot of 7 day average



Numbers on the right are yesterday's figures, and will differ a bit from the plotted rolling mean

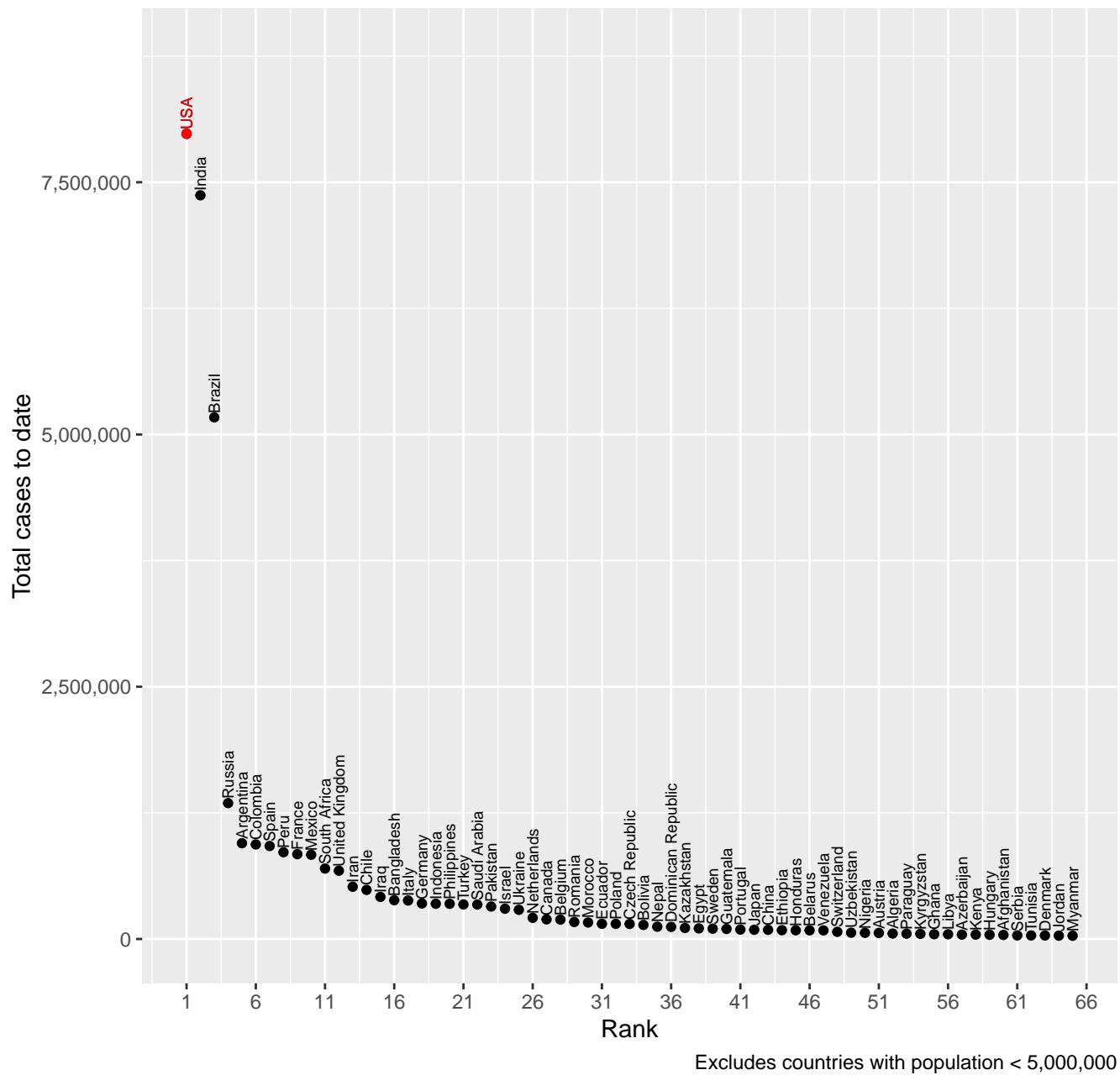
# Non-authoritarian Asian ensemble projection as of 2020-10-16

Japan, South Korea, Thailand, and Vietnam (Population = 328 MM)



(774) -- Deaths: 2,185 (6) -- Case Mortality: 1.8% -- Daily Change: +1.1% Cases, -1.5% Deaths

# Worldwide cases



# Worldwide cases

Total cases to date

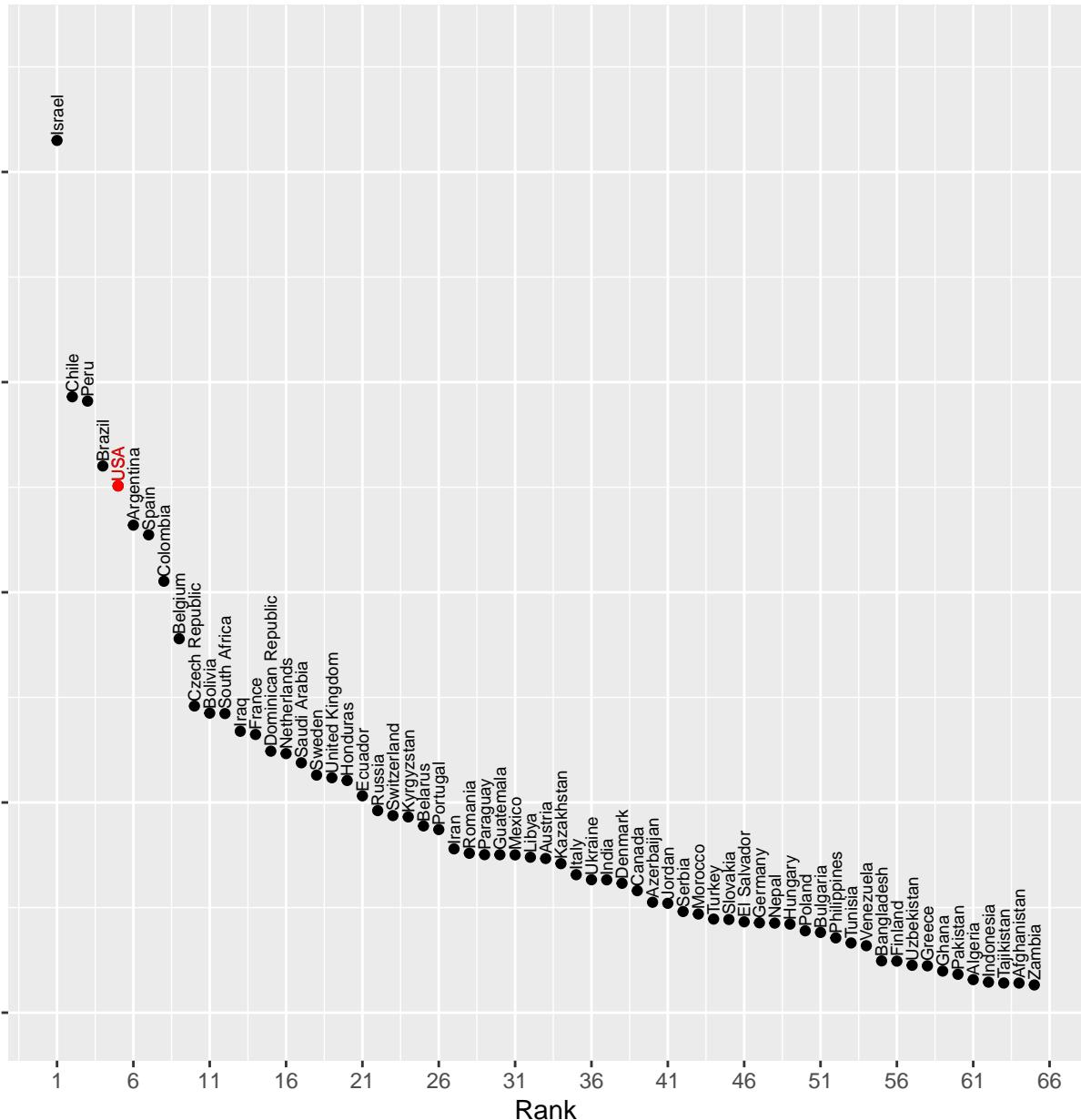
1 in 25 -

1 in 33 -

1 in 50 -

1 in 100 -

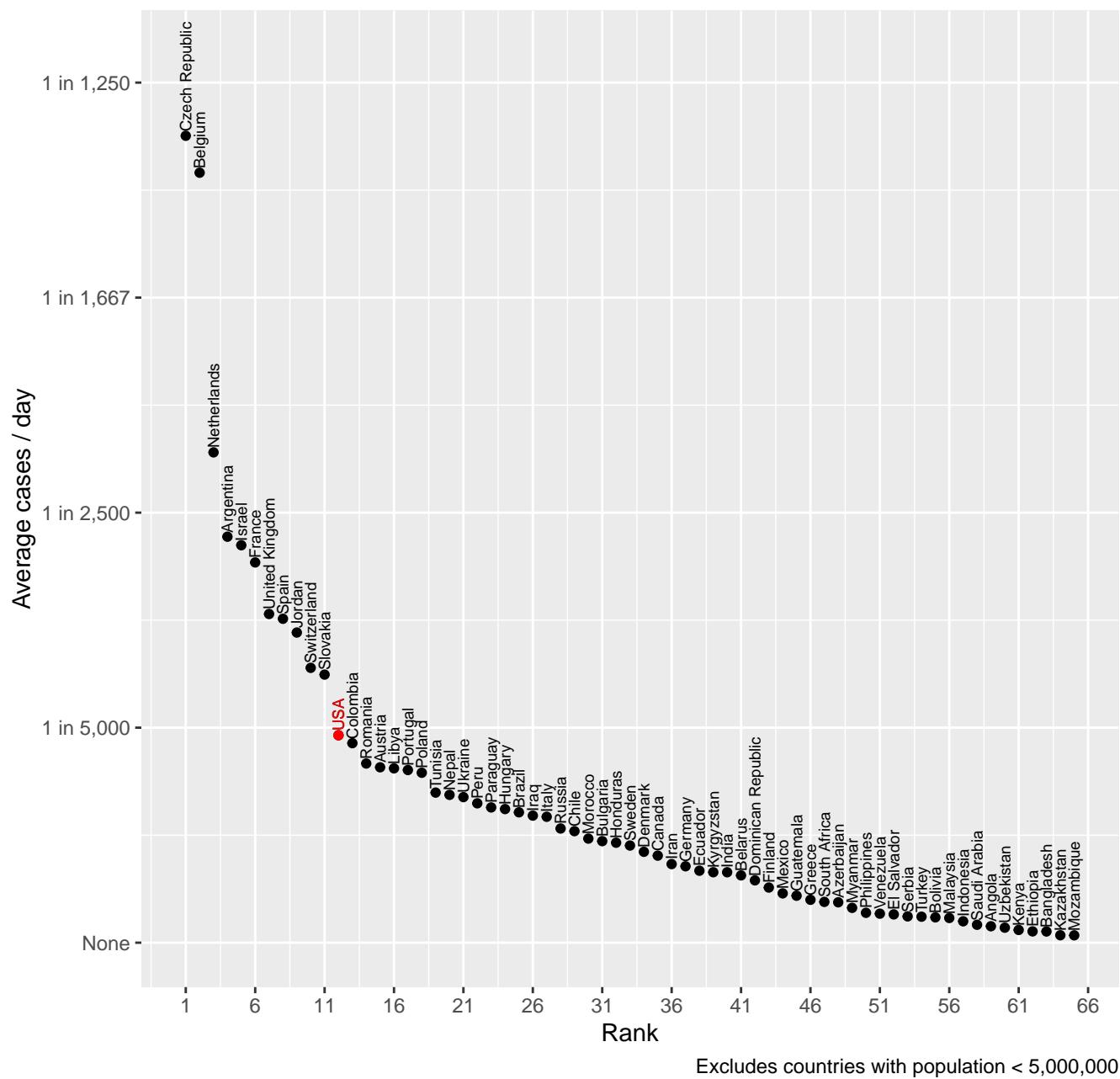
None -



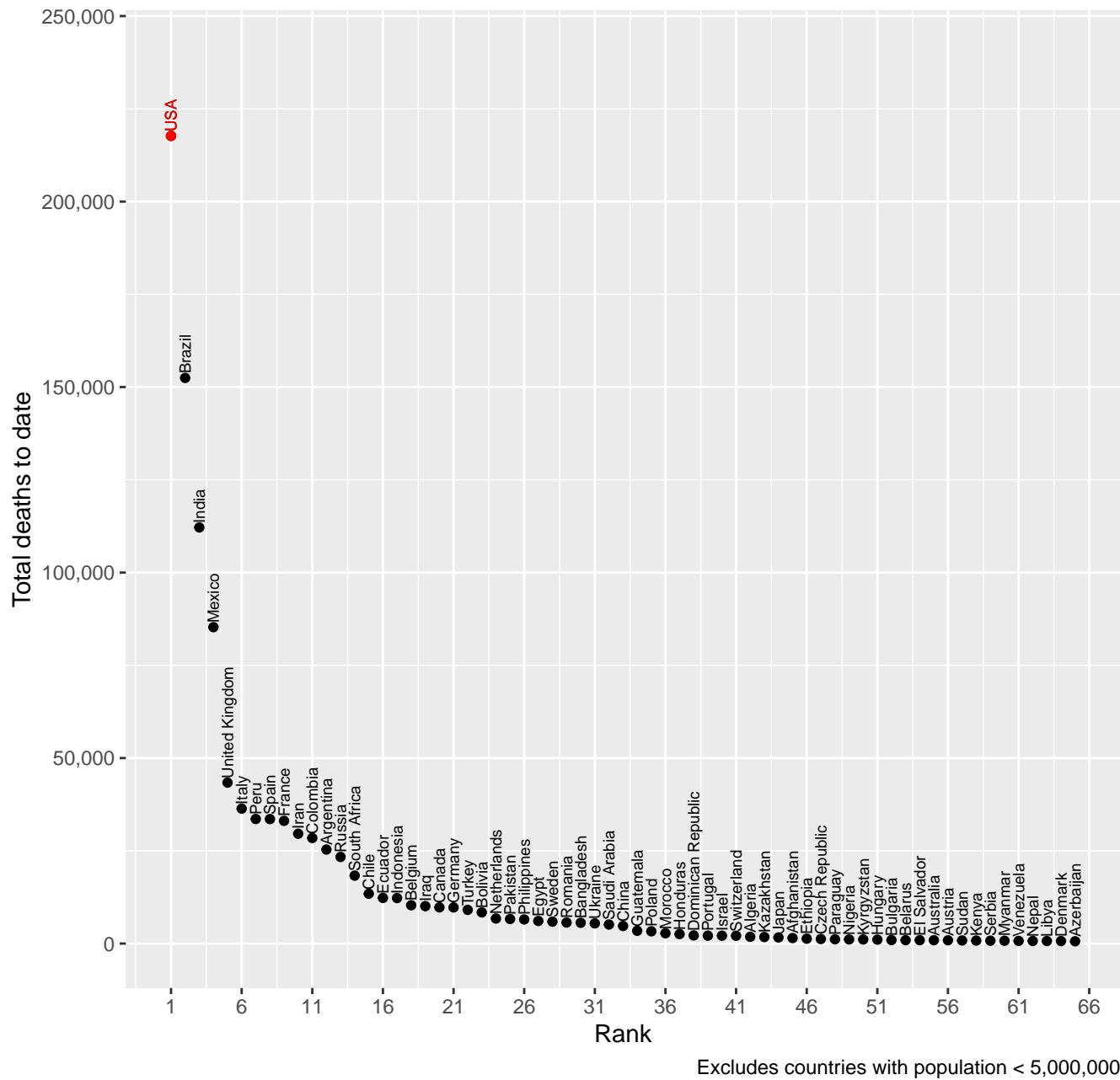
Rank

Excludes countries with population < 5,000,000

# Average new cases over past 7 days



# Worldwide deaths



# Worldwide deaths

Total deaths to date

1 in 833 -

1 in 1,000 -

1 in 1,250 -

1 in 1,667 -

1 in 2,500 -

1 in 5,000 -

None -

1

6

11

16

21

26

31

36

41

46

51

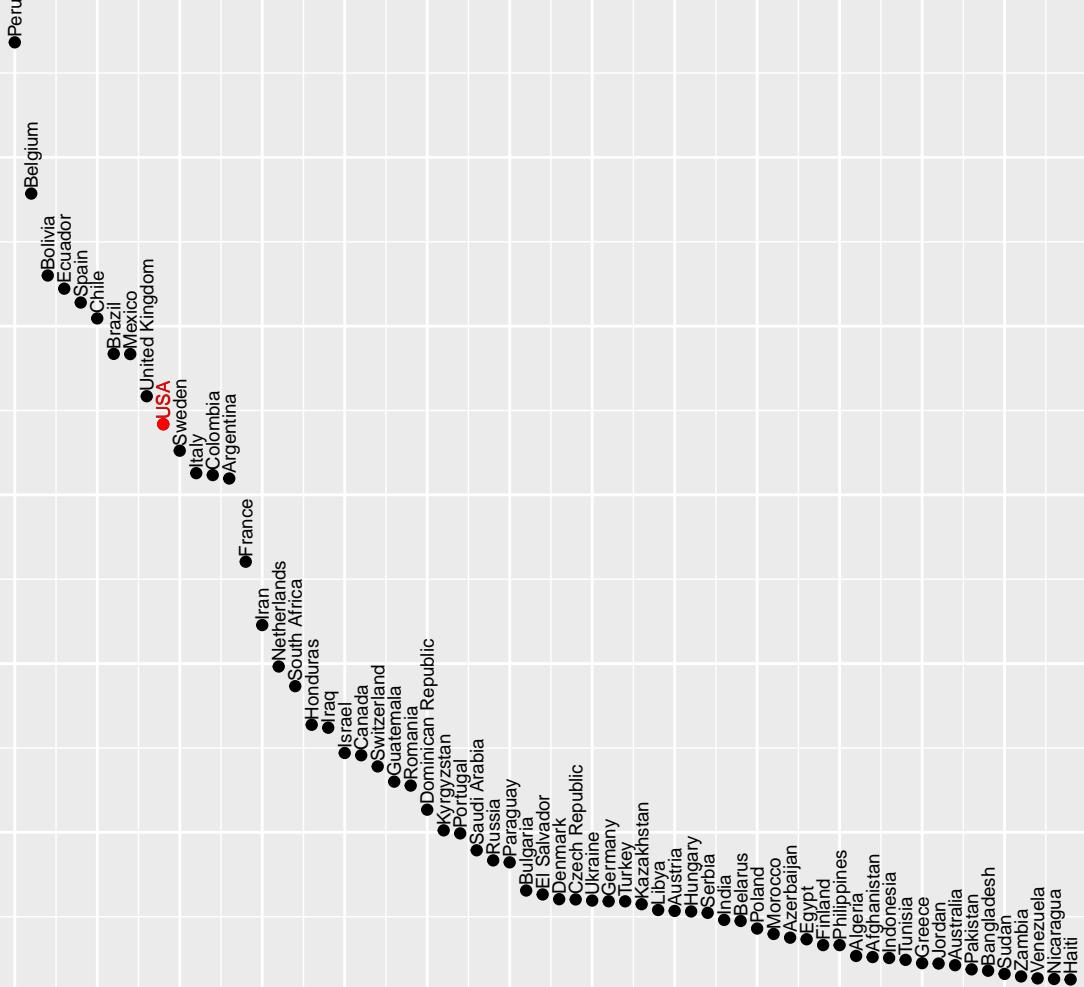
56

61

66

Rank

Excludes countries with population < 5,000,000



# Average daily deaths over past 7 days

1 in 83,333 -

Argentina

1 in 100,000 -

Israel  
Czech Republic  
Ecuador

1 in 125,000 -

Iran  
Colombia

Spain

Jordan

Paraguay

Mexico

Peru

Bolivia

South Africa

Brazil

Romania

Chile

Belgium

USA

Hungary

Ukraine

Iraq

Tunisia

Poland

United Kingdom

Libya

Russia

Honduras

Netherlands

Bulgaria

Morocco

Guatemala

Portugal

Saudi Arabia

Turkey

Philippines

Austria

France

Honduras

Bulgaria

Morocco

Guatemala

Portugal

Saudi Arabia

Turkey

Philippines

Austria

France

Honduras

Bulgaria

Morocco

Guatemala

Portugal

Saudi Arabia

Turkey

Philippines

Austria

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Saudi Arabia

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Saudi Arabia

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Guatemala

Portugal

Saudi Arabia

Turkey

Philippines

Austria

France

Honduras

Bulgaria

Morocco

Guatemala

Portugal

Saudi Arabia

Turkey

None -

1

6

11

16

21

26

31

36

41

46

51

56

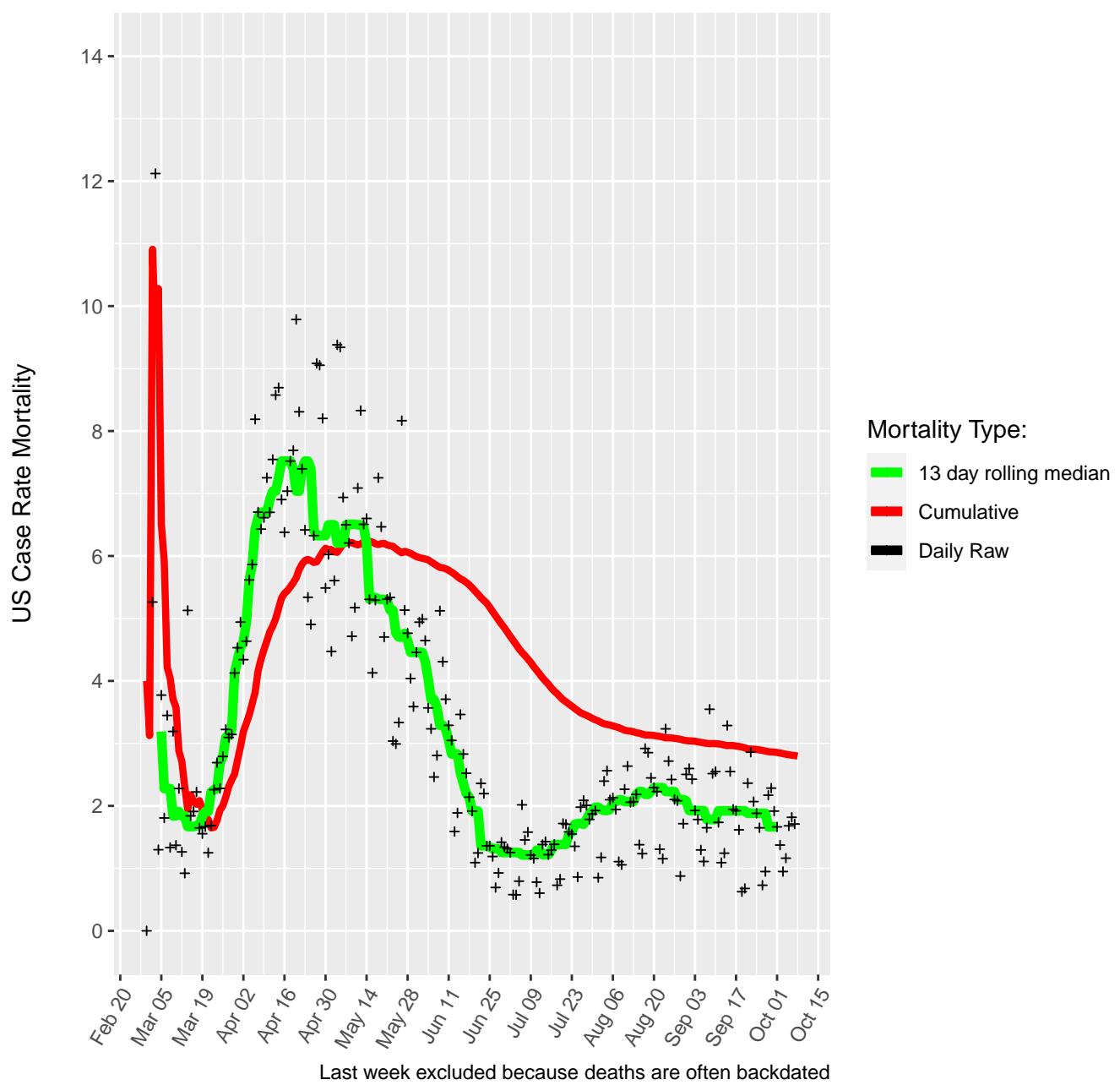
61

66

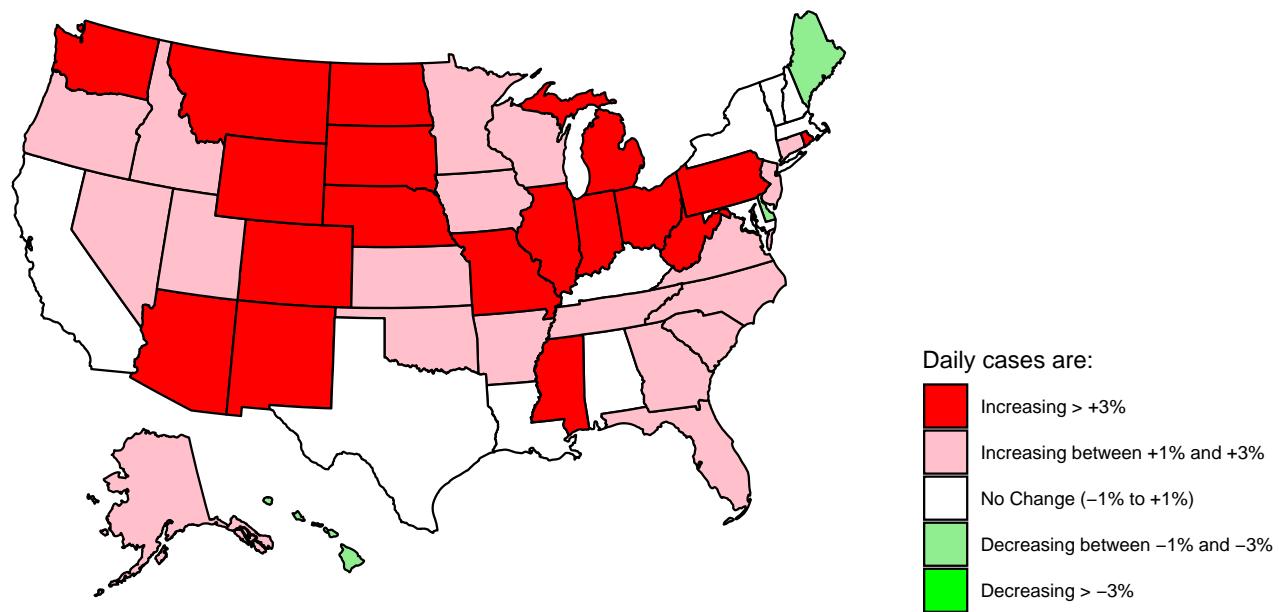
Rank

Excludes countries with population < 5,000,000

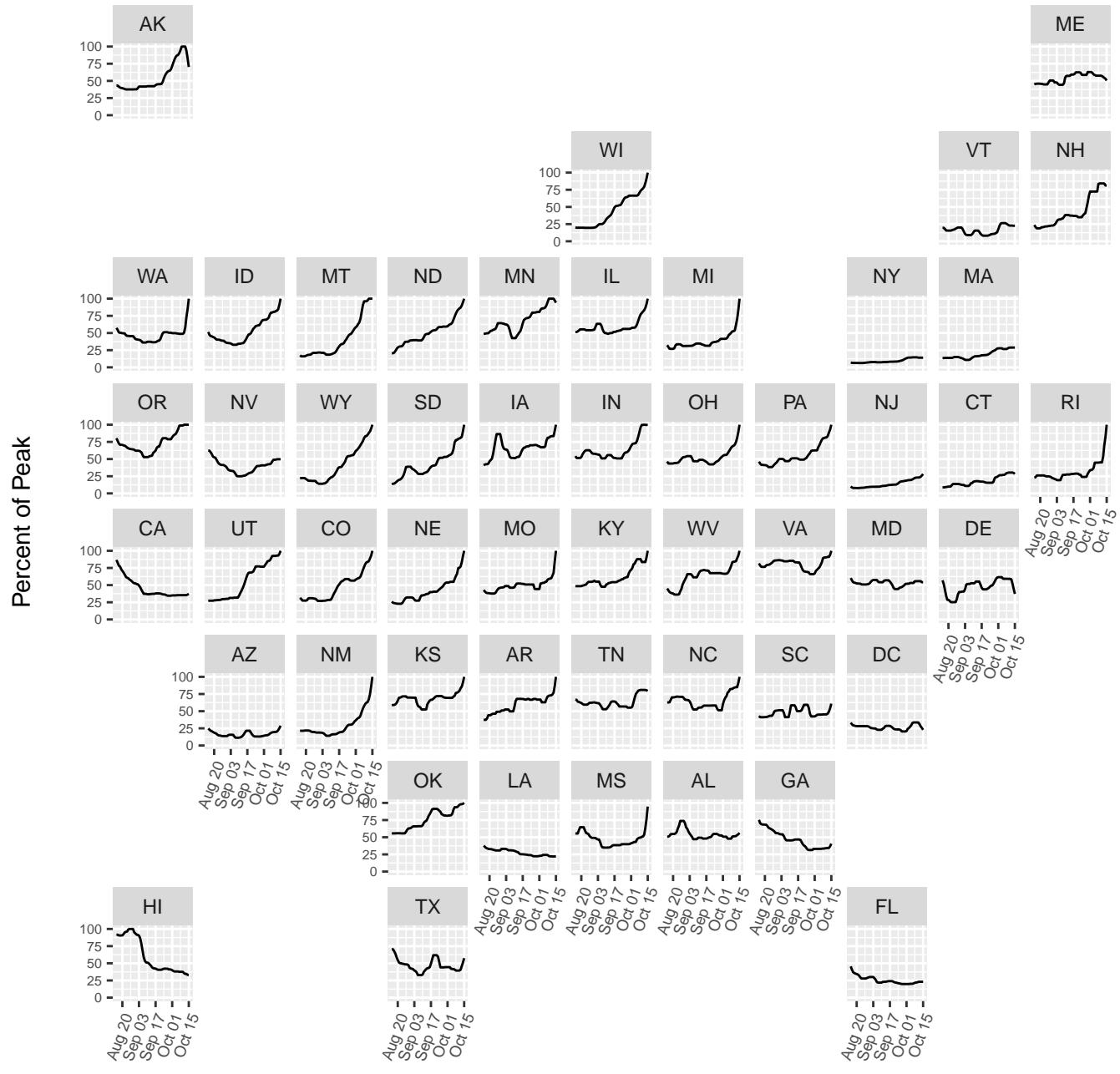
# Daily vs. Cumulative US Case Rate Mortality



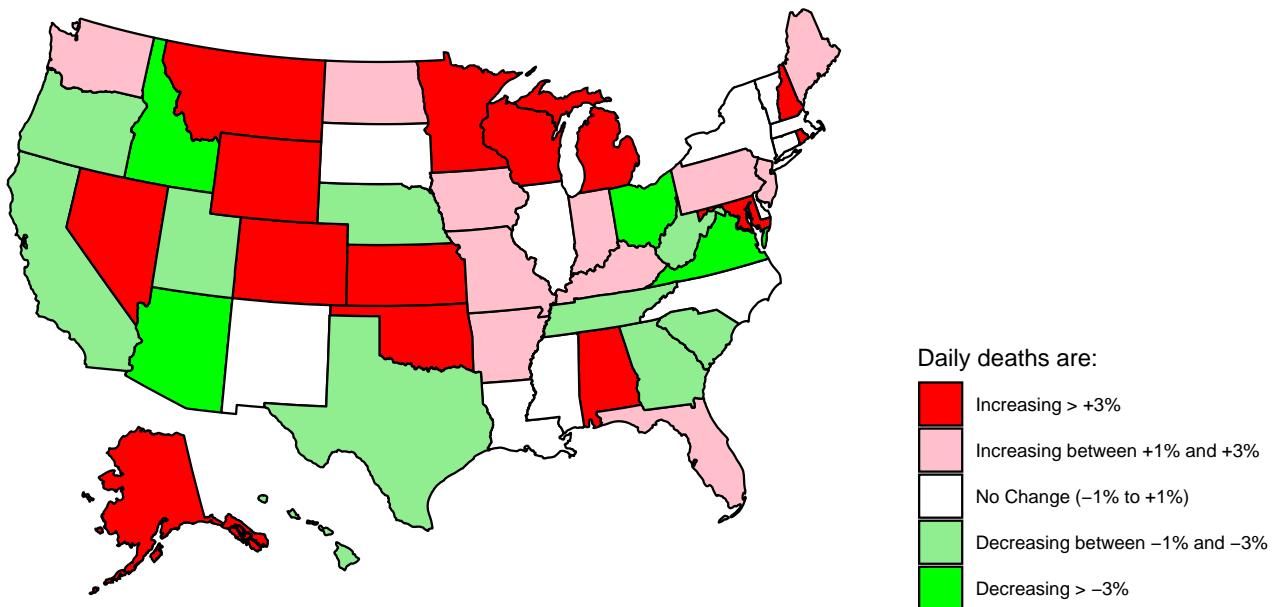
Daily cases by state as of 2020–10–16



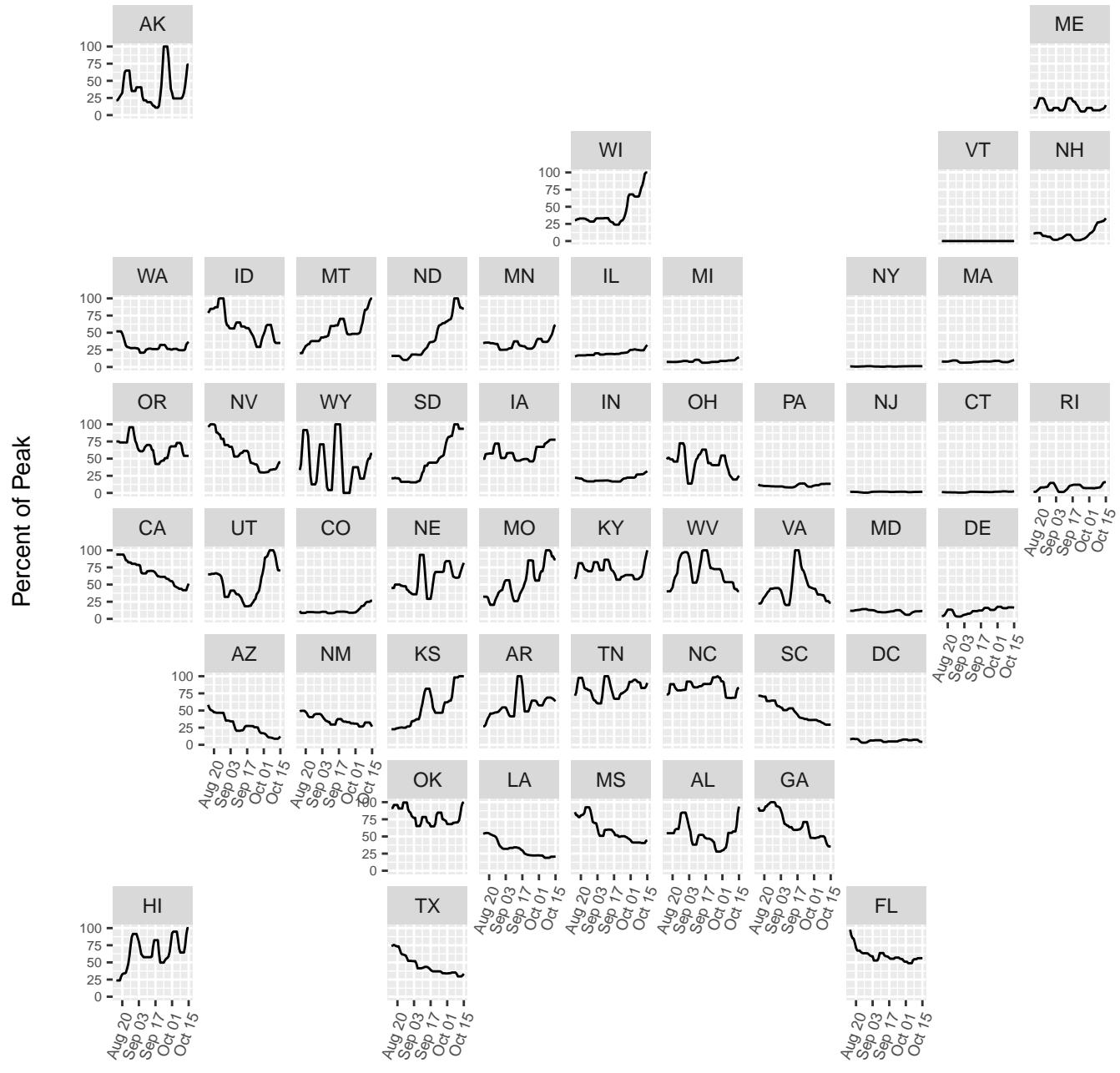
# Daily Cases as a Percent of Peak Cases



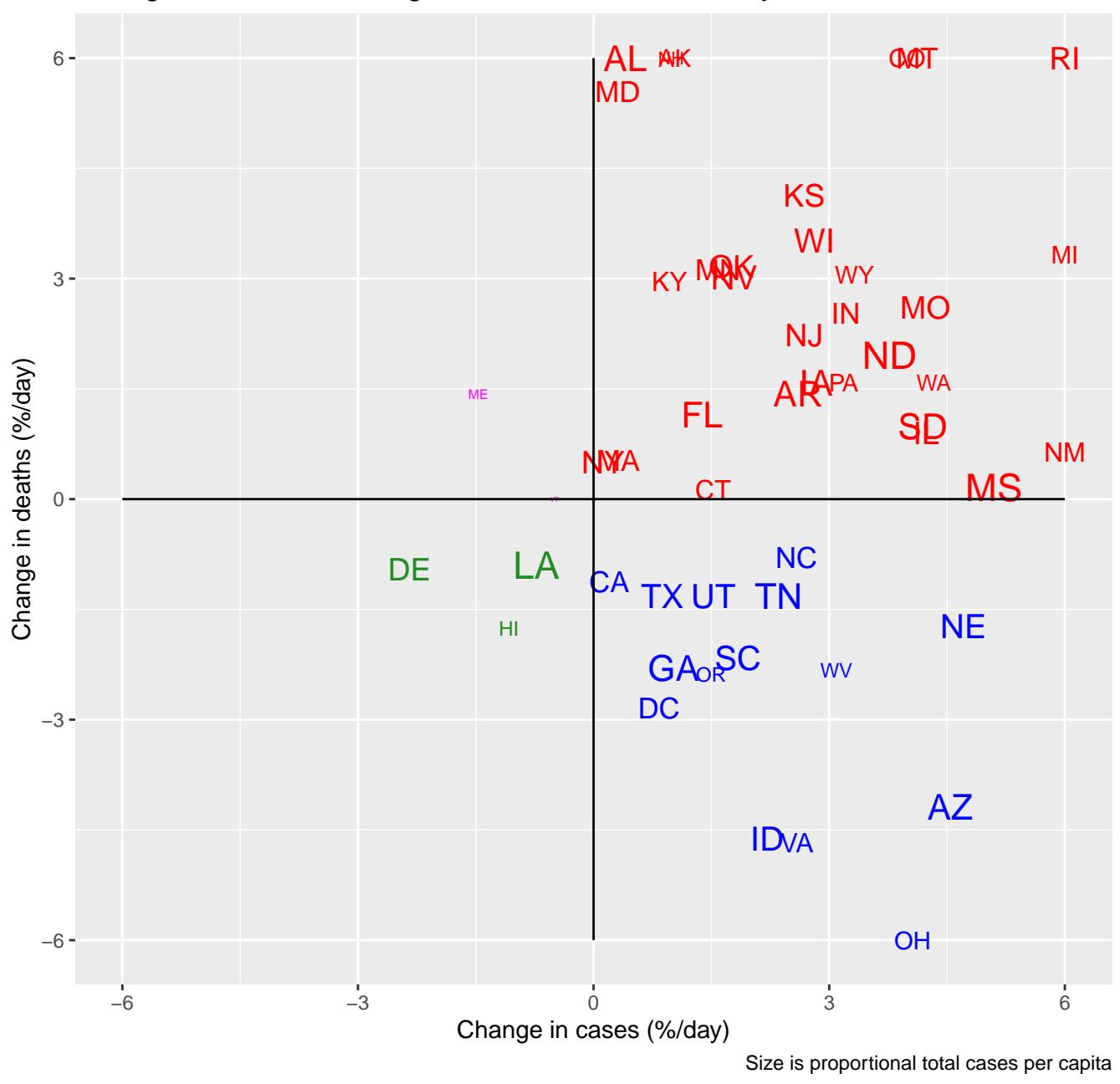
Daily deaths by state as of 2020-10-16



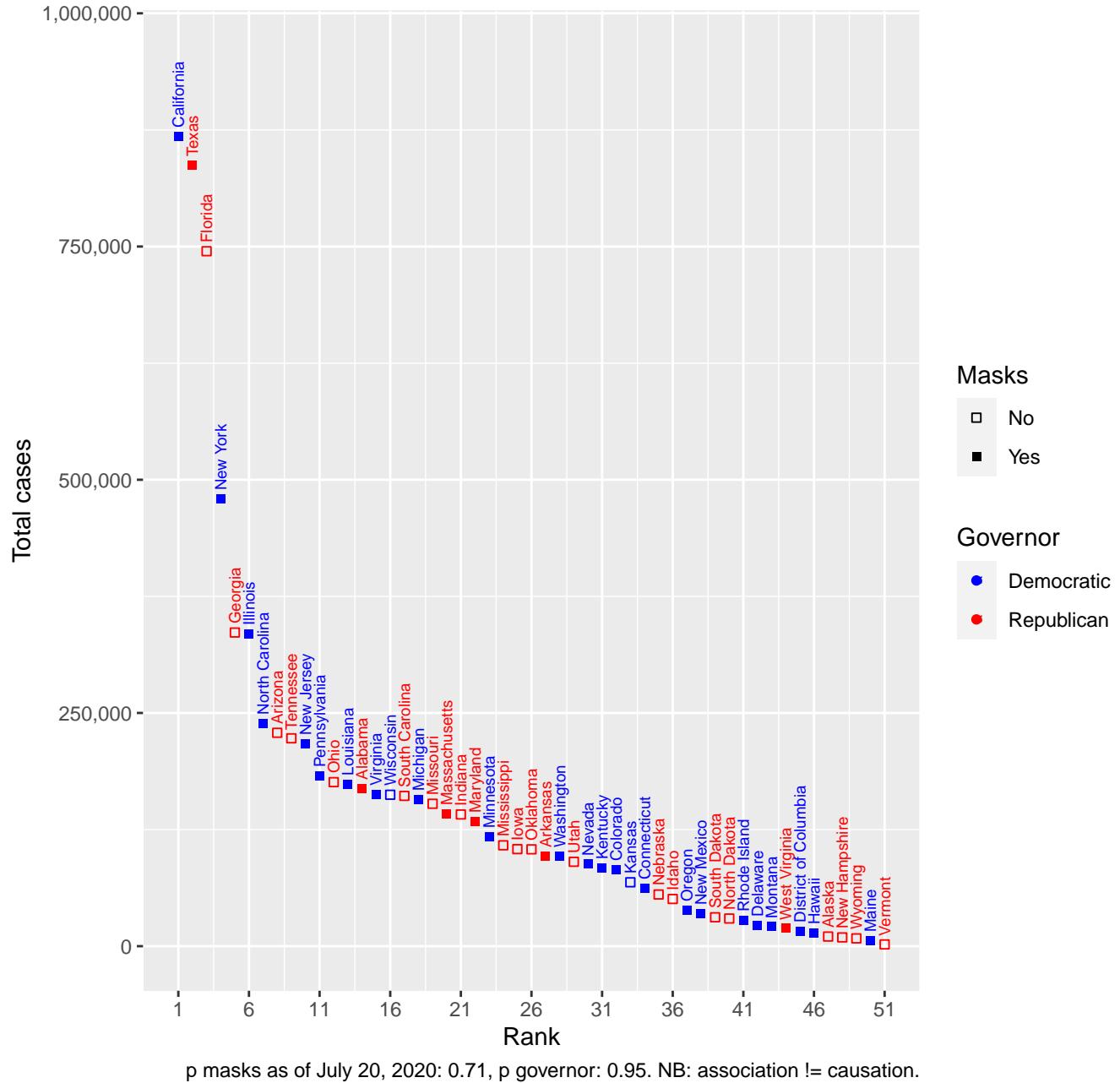
# Daily Deaths as a Percent of Peak Deaths



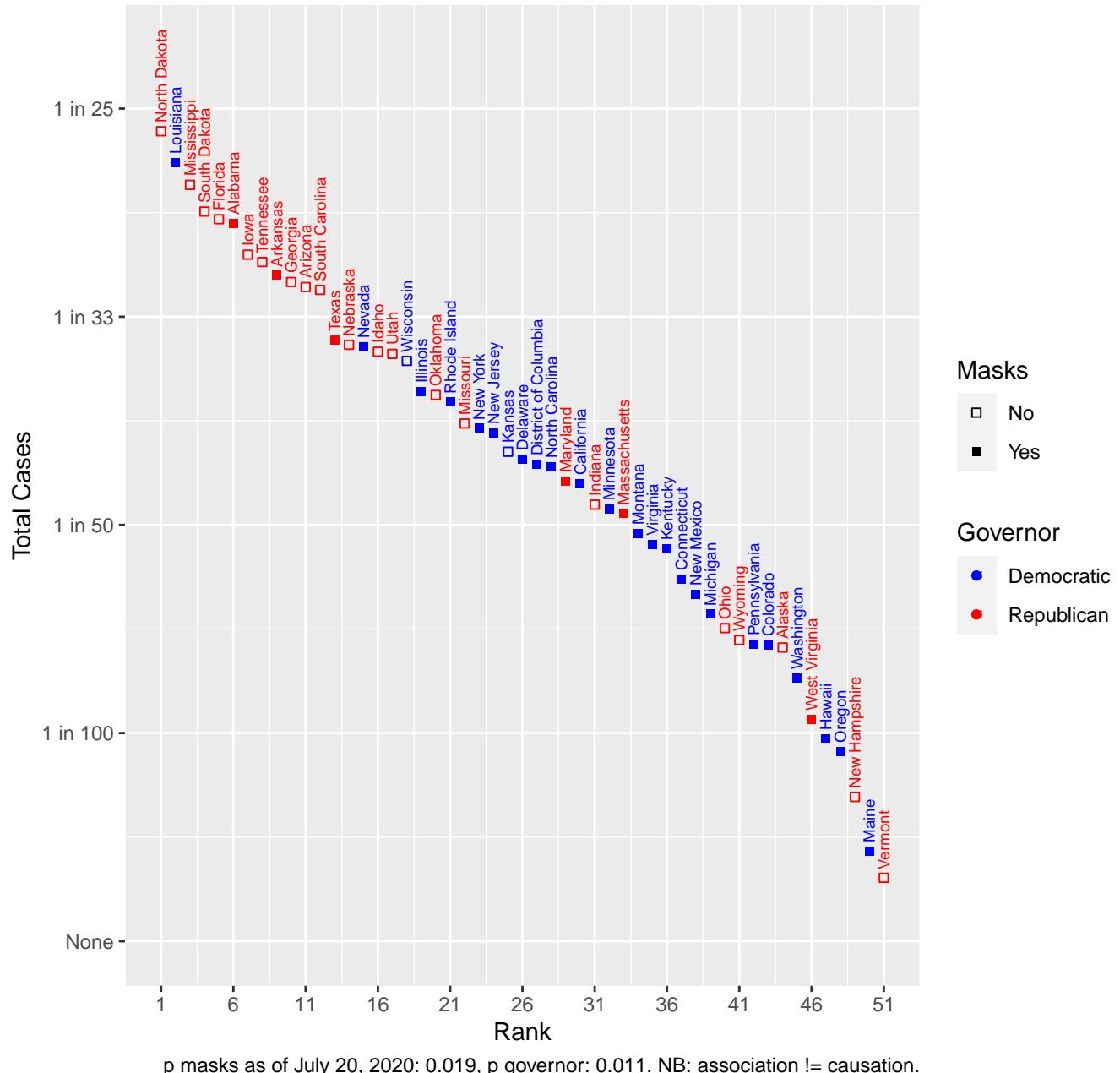
# Change in cases vs. change in deaths over last 14 days as of 2020-10-16



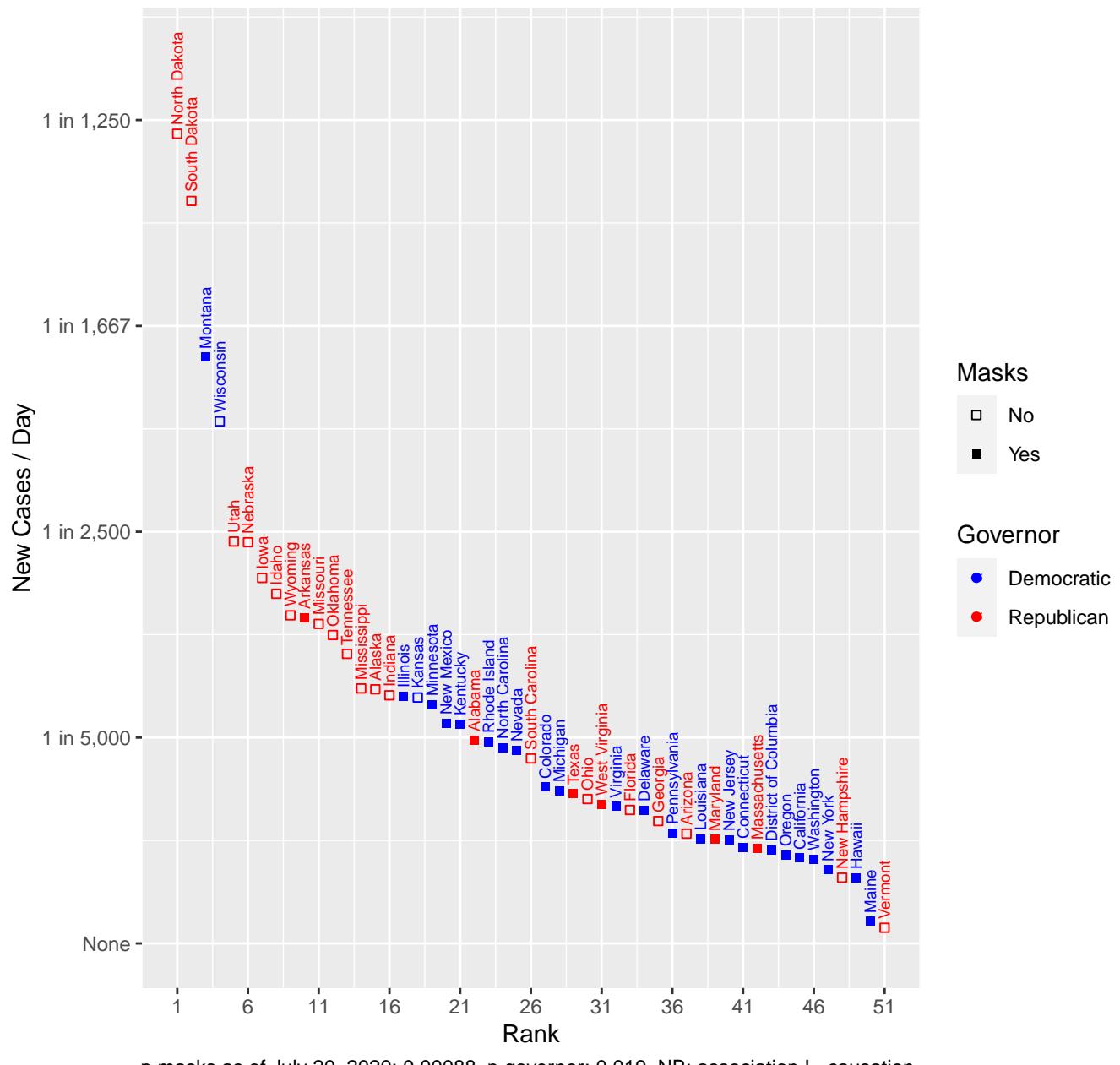
# Total US COVID-19 Cases



# Total US COVID-19 Cases



# Average US COVID–19 cases over the past 7 days



# Total US COVID-19 Deaths

Total Deaths

30,000

20,000

10,000

0

1

6

11

16

21

26

31

36

41

46

51

Rank

p masks as of July 20, 2020: 0.078, p governor: 0.45. NB: association != causation.

New York

Texas

California

New Jersey

Florida

Massachusetts

Illinois

Pennsylvania

Arizona

Louisiana

Georgia

Michigan

Ohio

Connecticut

North Carolina

Indiana

South Carolina

Virginia

Mississippi

Tennessee

Alabama

Missouri

Minnesota

Washington

Colorado

Nevada

Arkansas

Wisconsin

Iowa

Kentucky

Rhode Island

Oklahoma

New Mexico

Kansas

Delaware

District of Columbia

Oregon

Nebraska

Utah

Idaho

New Hampshire

West Virginia

North Dakota

South Dakota

Montana

Hawaii

Maine

Alaska

Vermont

Wyoming

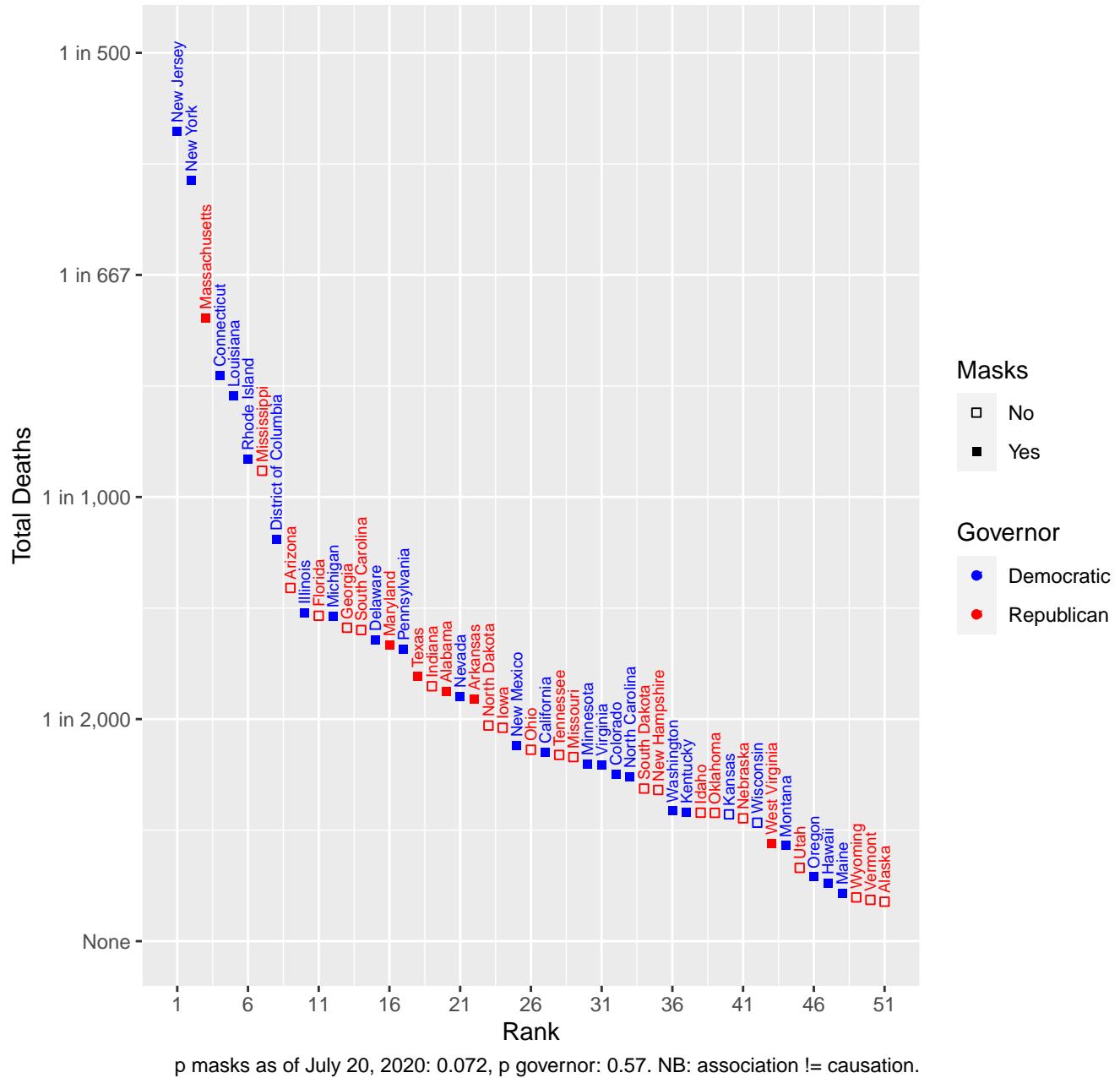
Masks

- No
- Yes

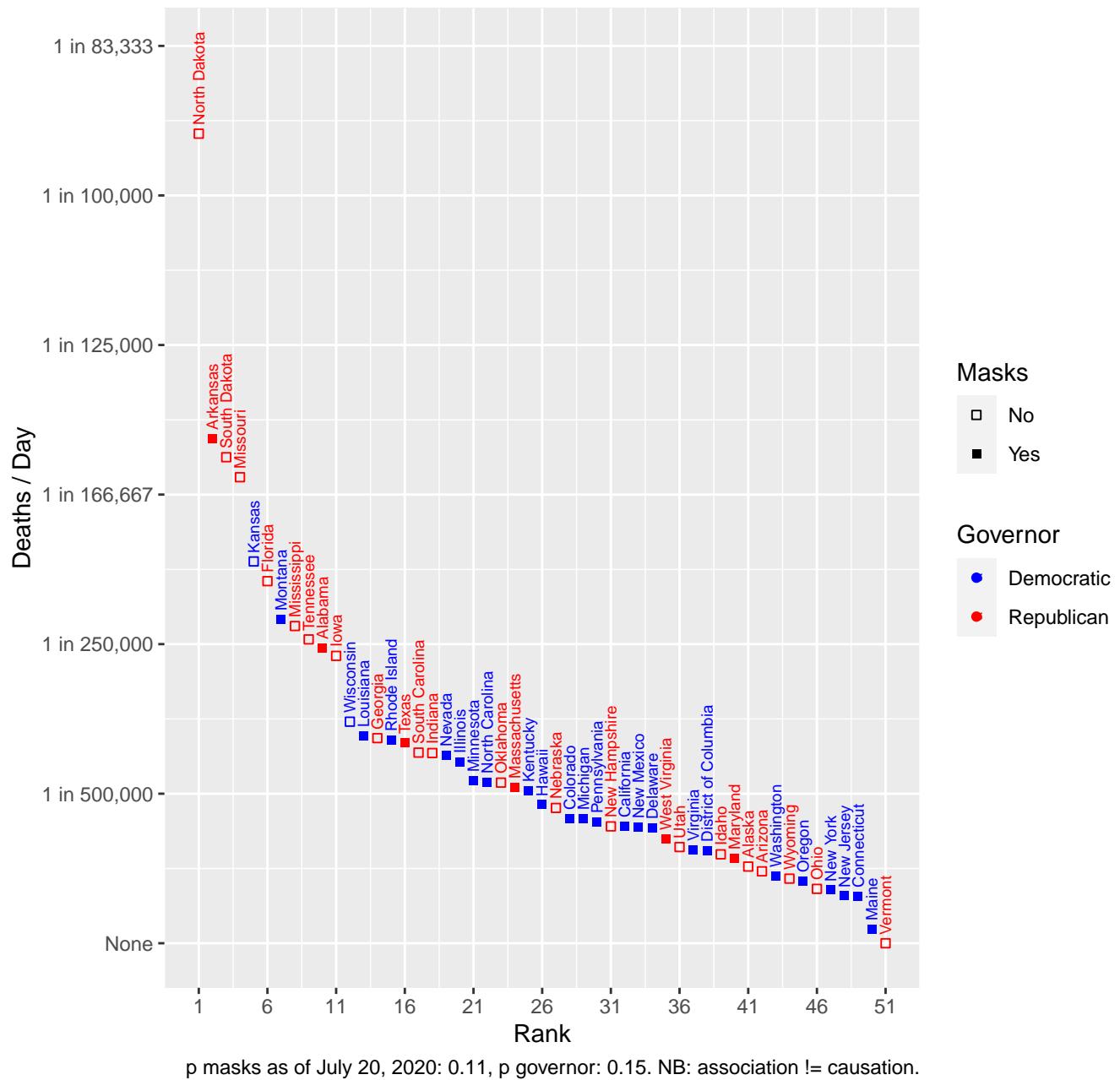
Governor

- Democratic
- Republican

# Total US COVID-19 Deaths

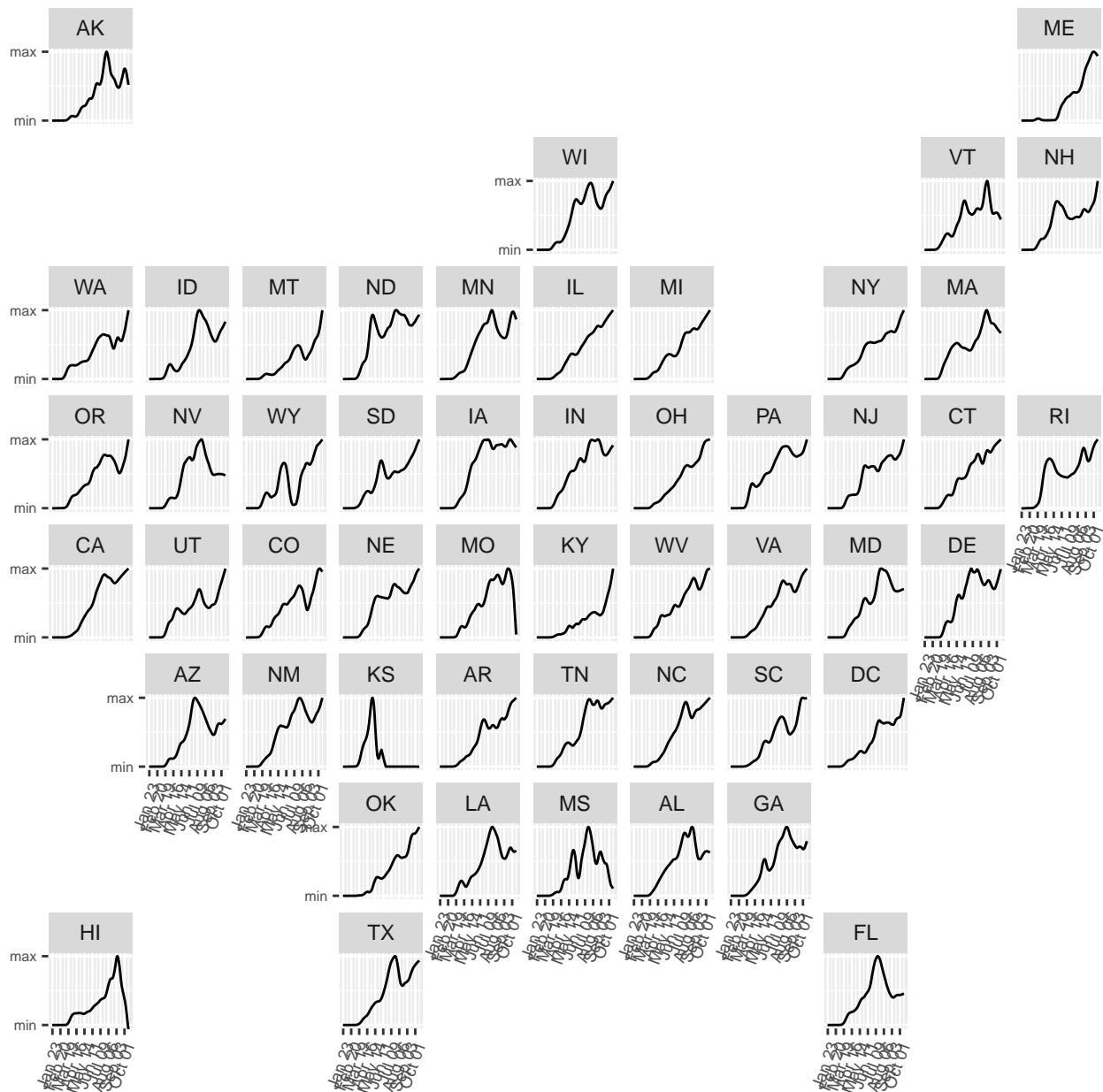


# Average US COVID-19 deaths over the past 7 days



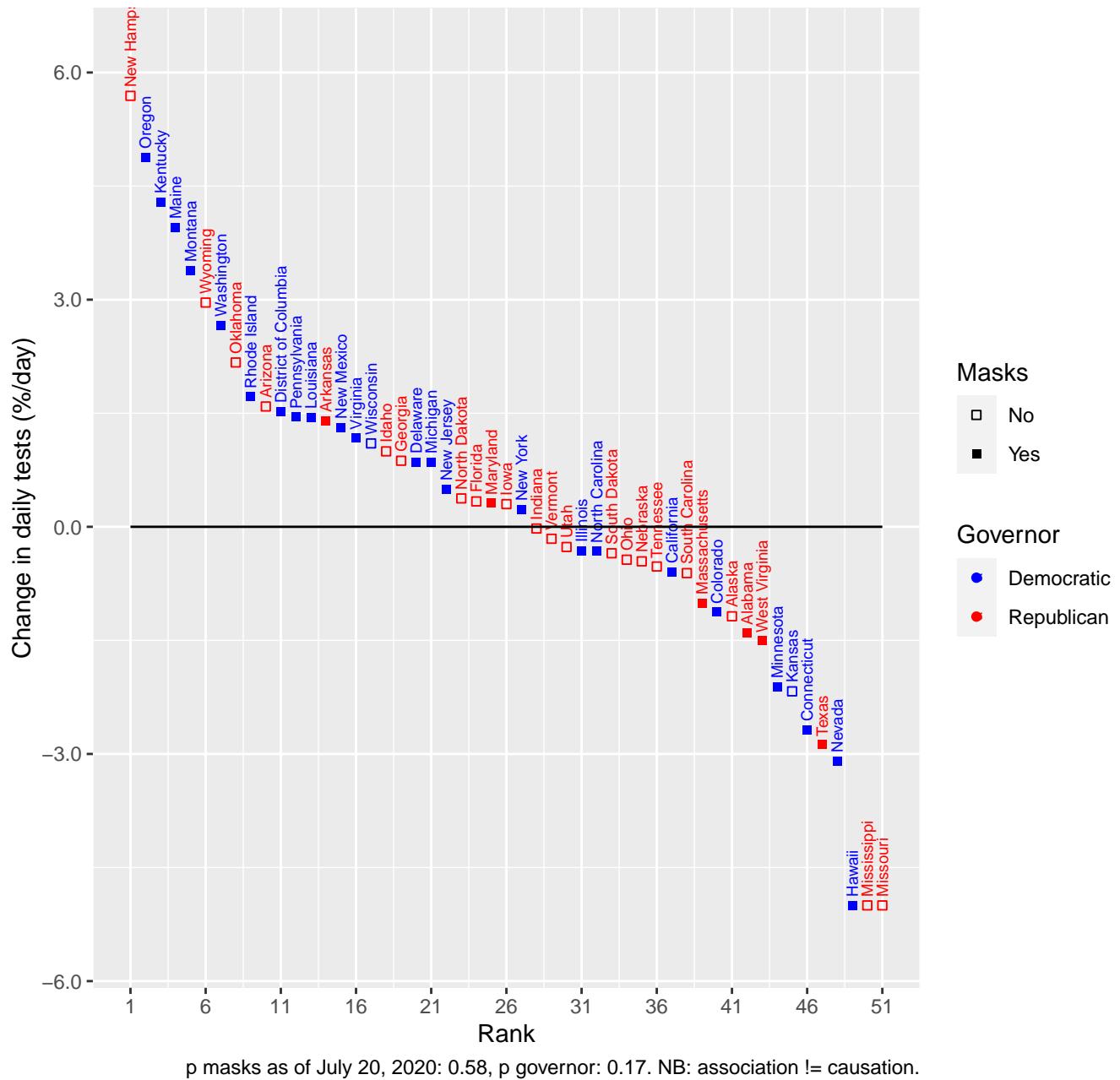
# Daily testing trends from min to max

Daily testing from min to max



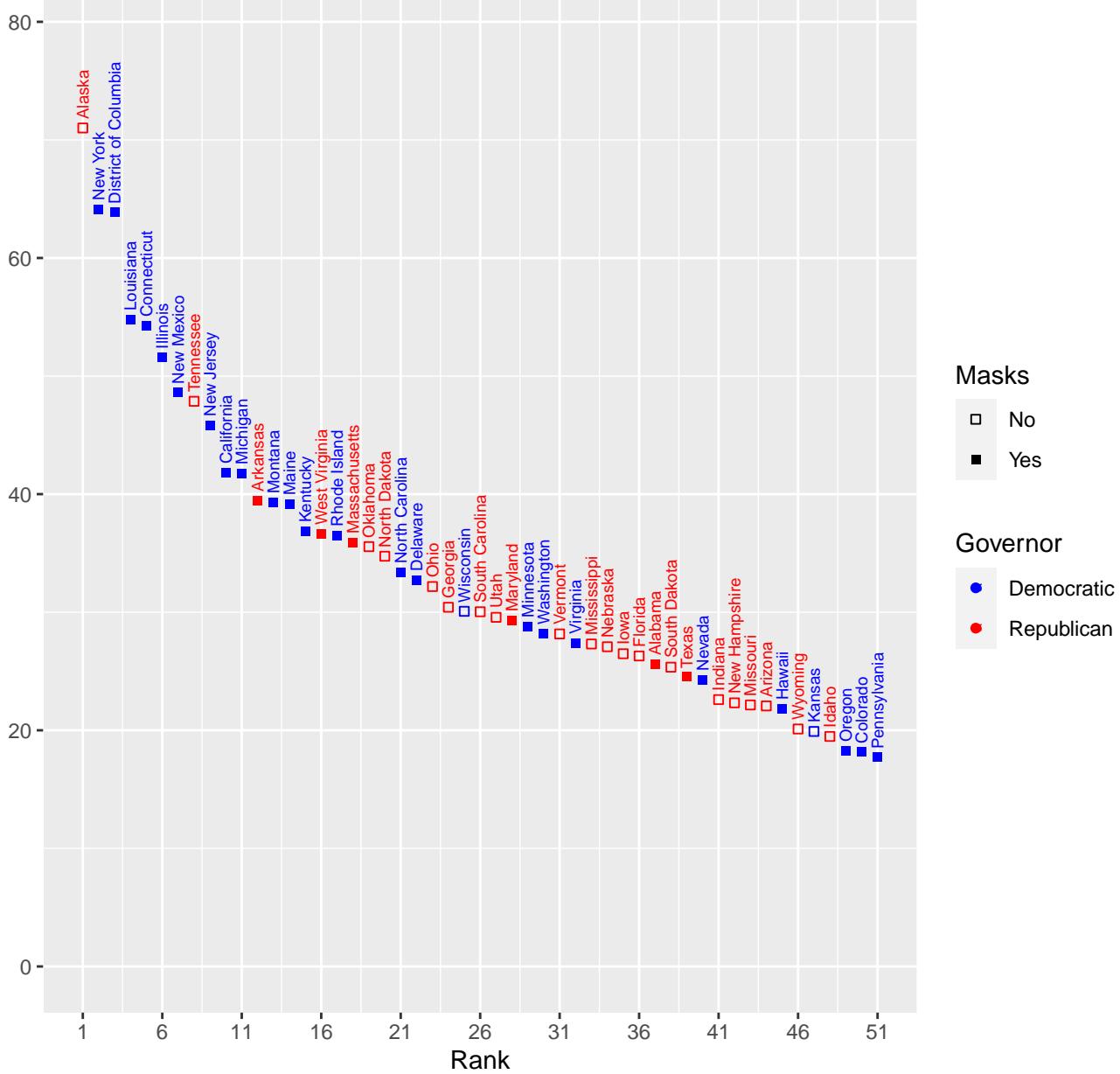
Line = Friedman's supersmooth

# Change in daily tests over past 14 days



# Percent Tested

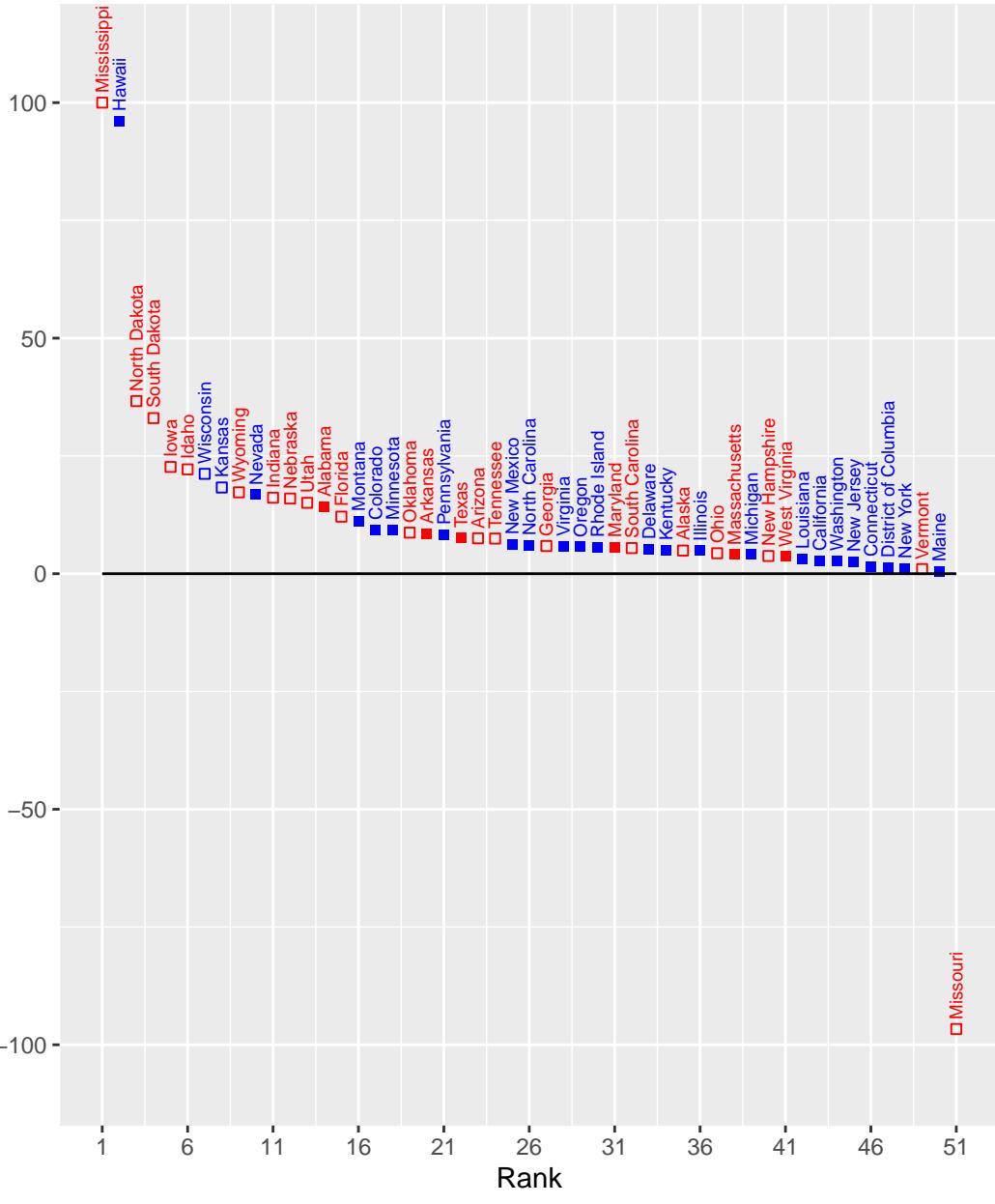
Percent Tested



p masks as of July 20, 2020: 0.023, p governor: 0.081. NB: association != causation.

# Percent of Positive COVID Tests

Percent of Positive Tests



Masks

- No
- Yes

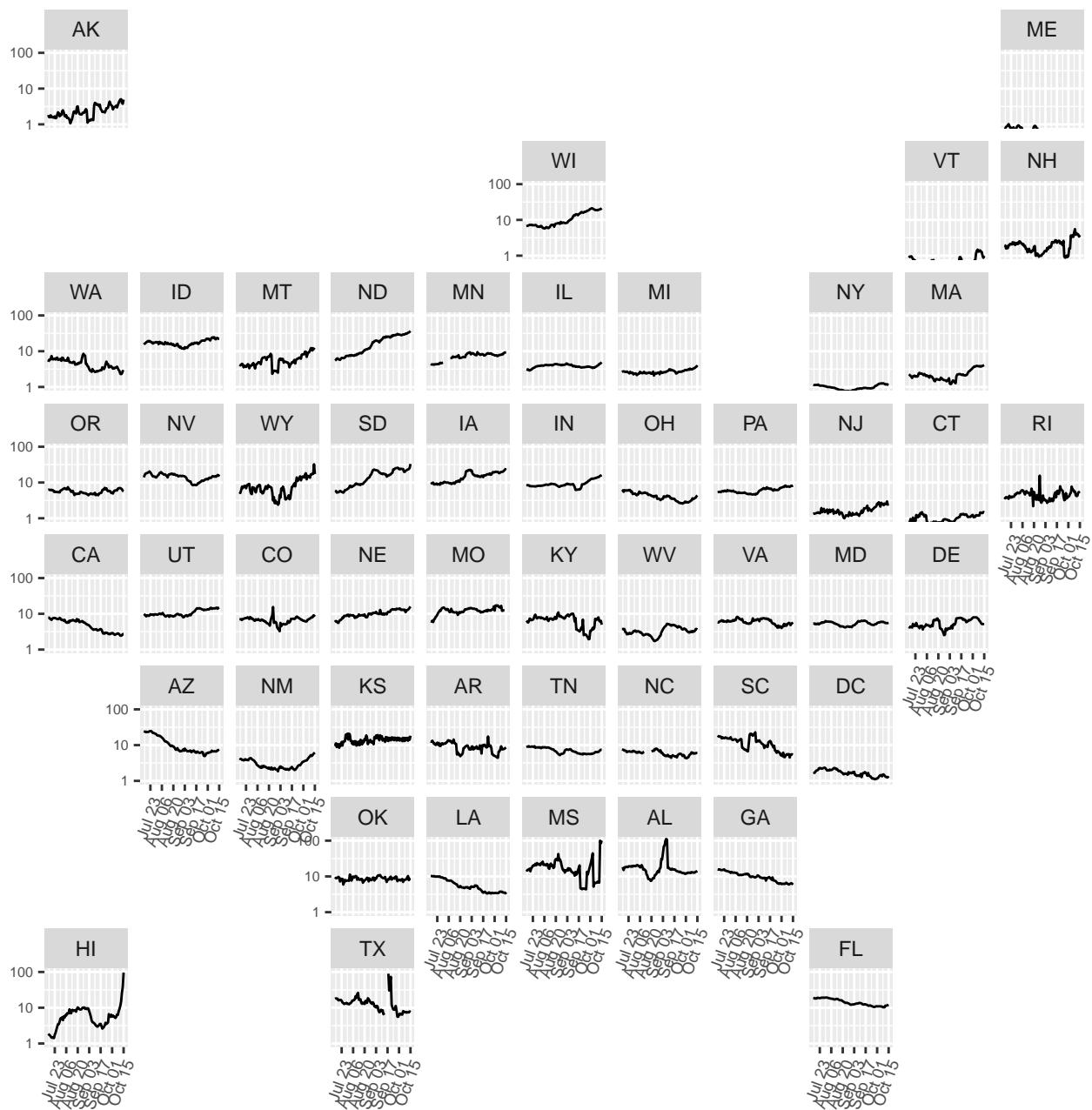
Governor

- Democratic
- Republican

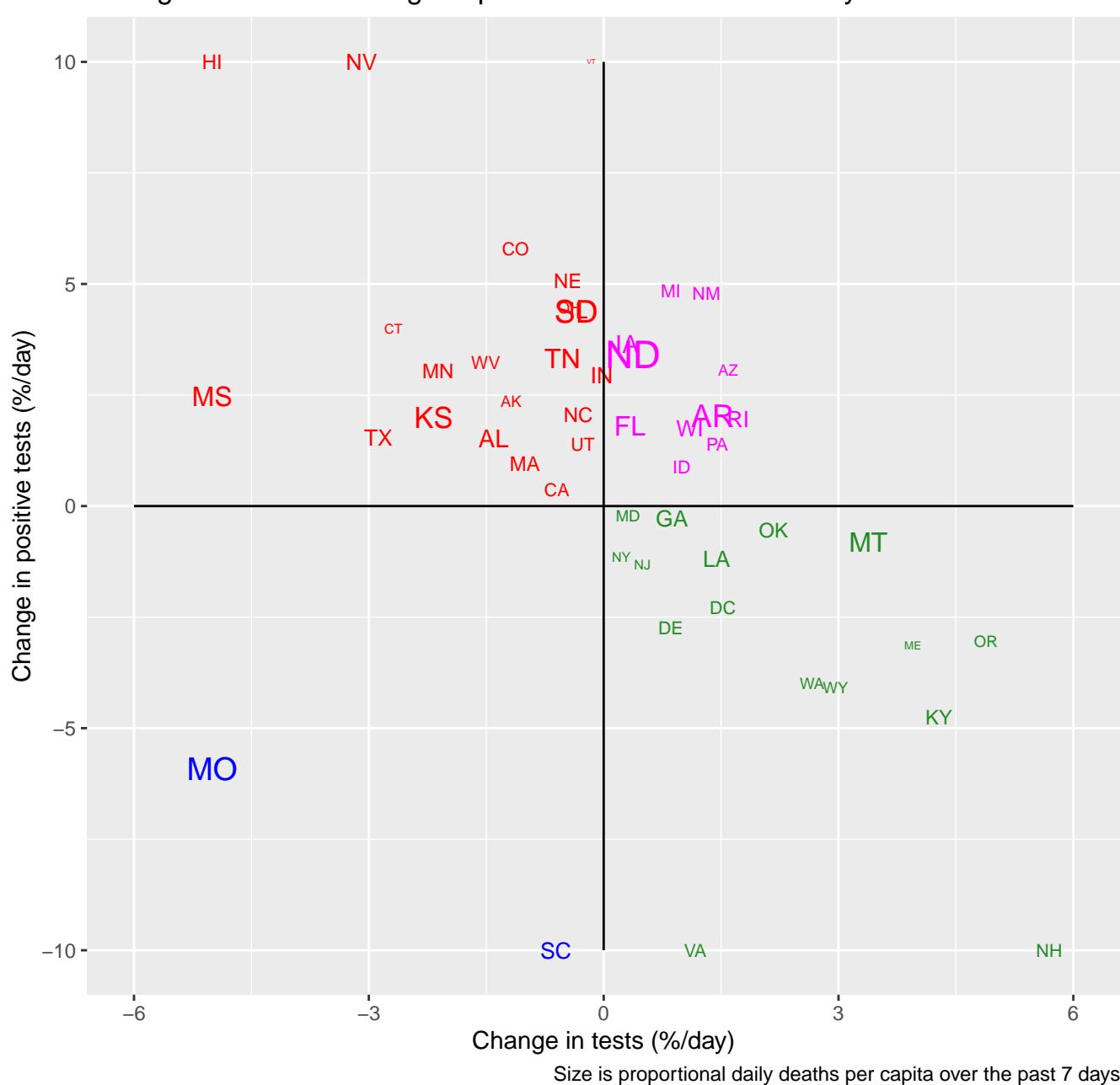
p masks as of July 20, 2020: 0.0068, p governor: 0.078. NB: association != causation.

# Percent Positive Trends

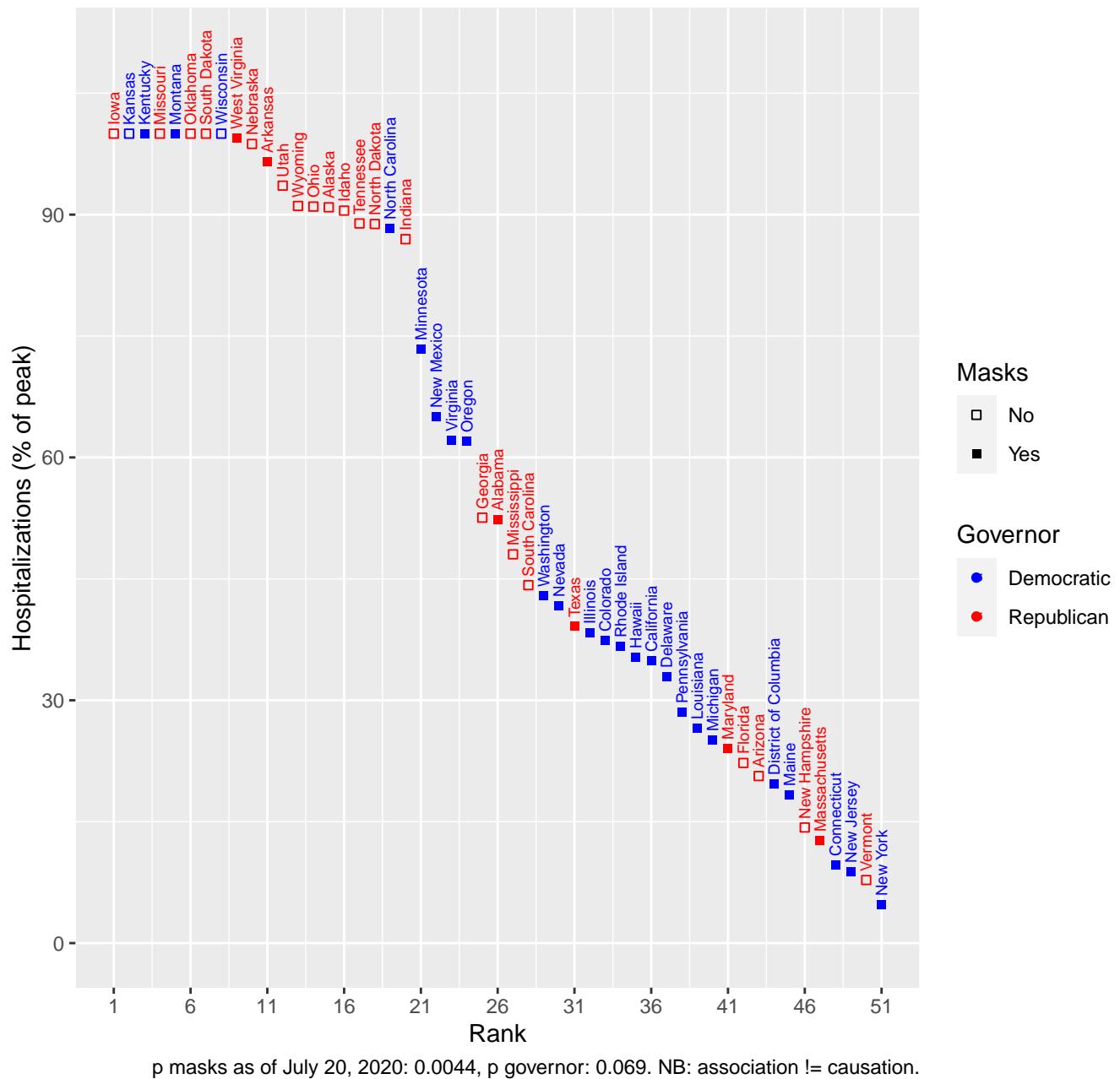
Percent Positive (log scale)



# Change in tests vs. change in positive tests over last 14 days as of 2020-10-16

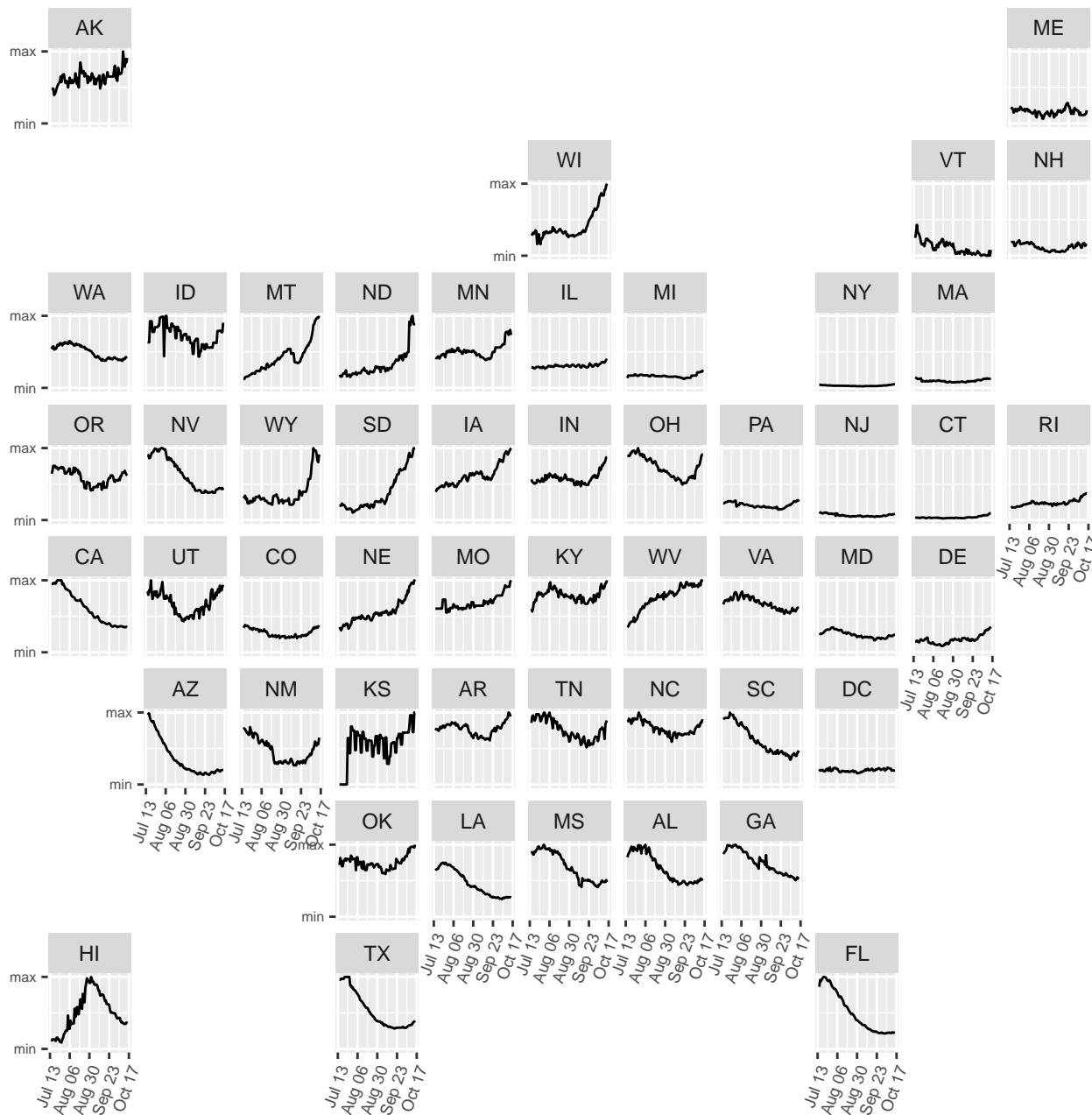


# Current hospitalizations as a percent of peak since February



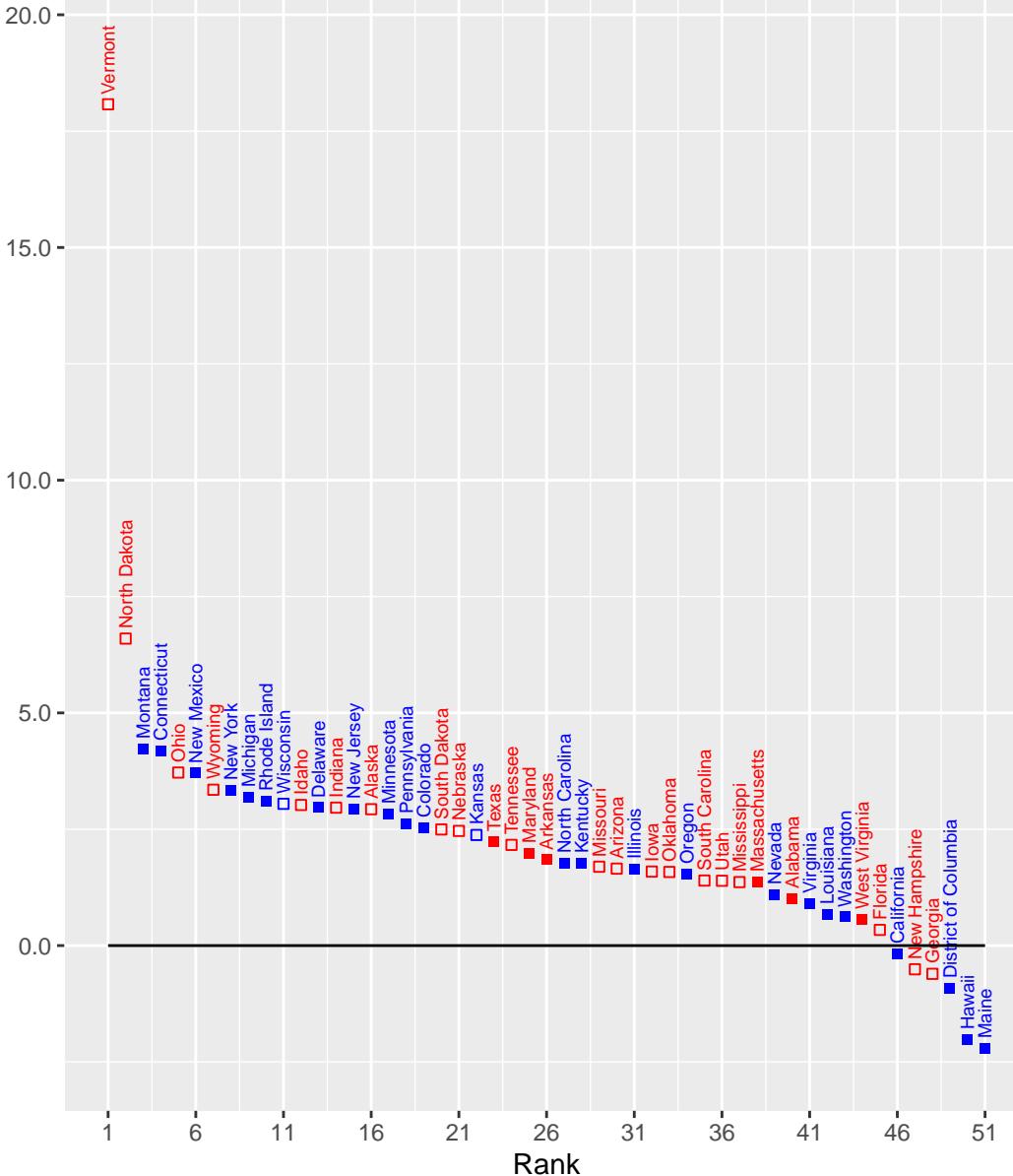
# Hospitalizations trends from min to max

Hospitalizations from min to max



# Change in hospitalizations over past 14 days

Change in hospitalizations (%/day)



Masks

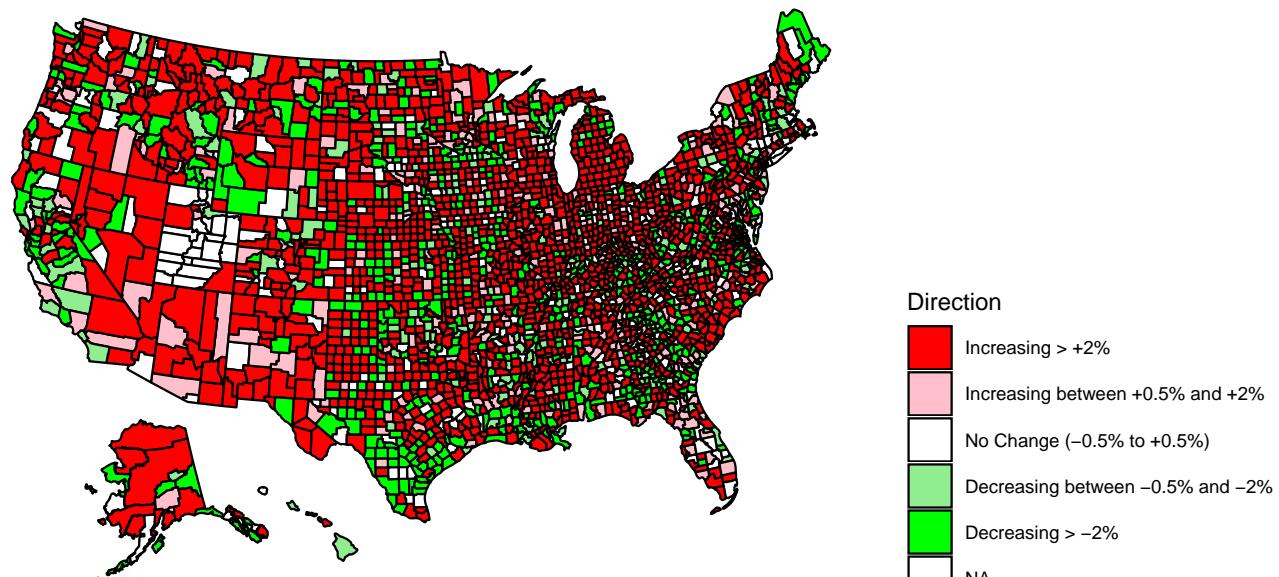
- No
- Yes

Governor

- Democratic
- Republican

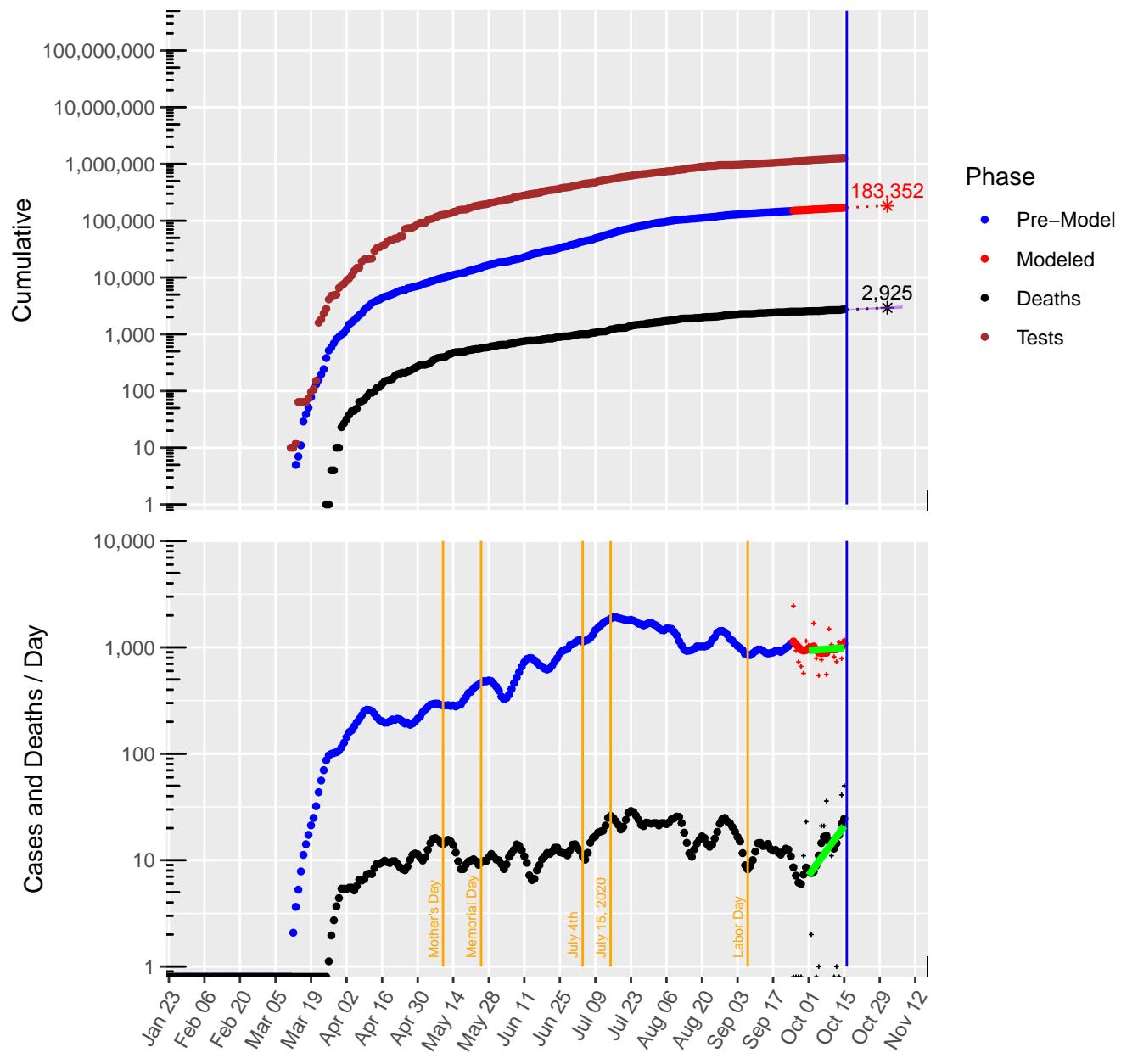
p masks as of July 20, 2020: 0.4, p governor: 0.8. NB: association != causation.

Trends by county as of 2020-10-16

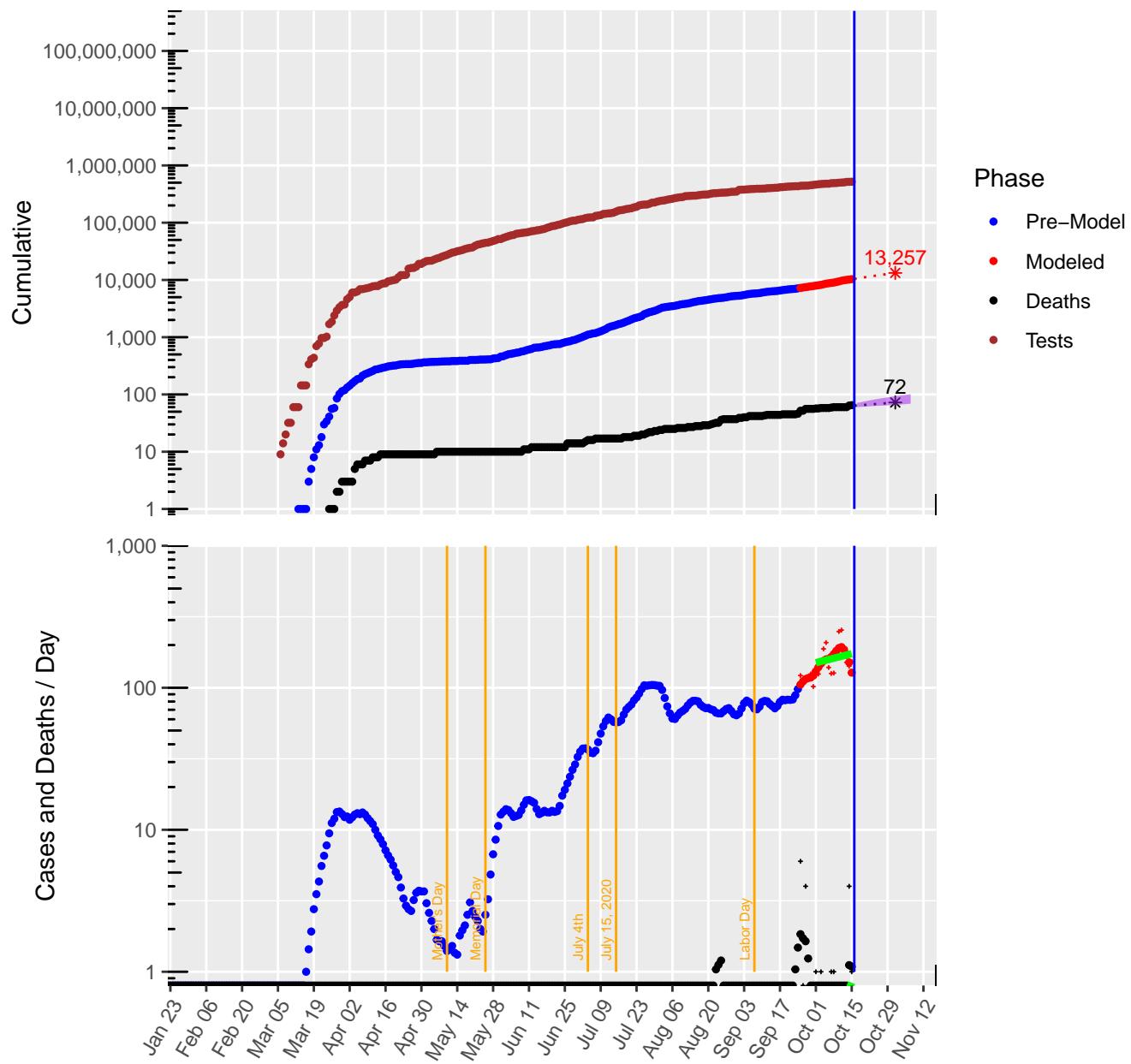


NA = Inadequate data

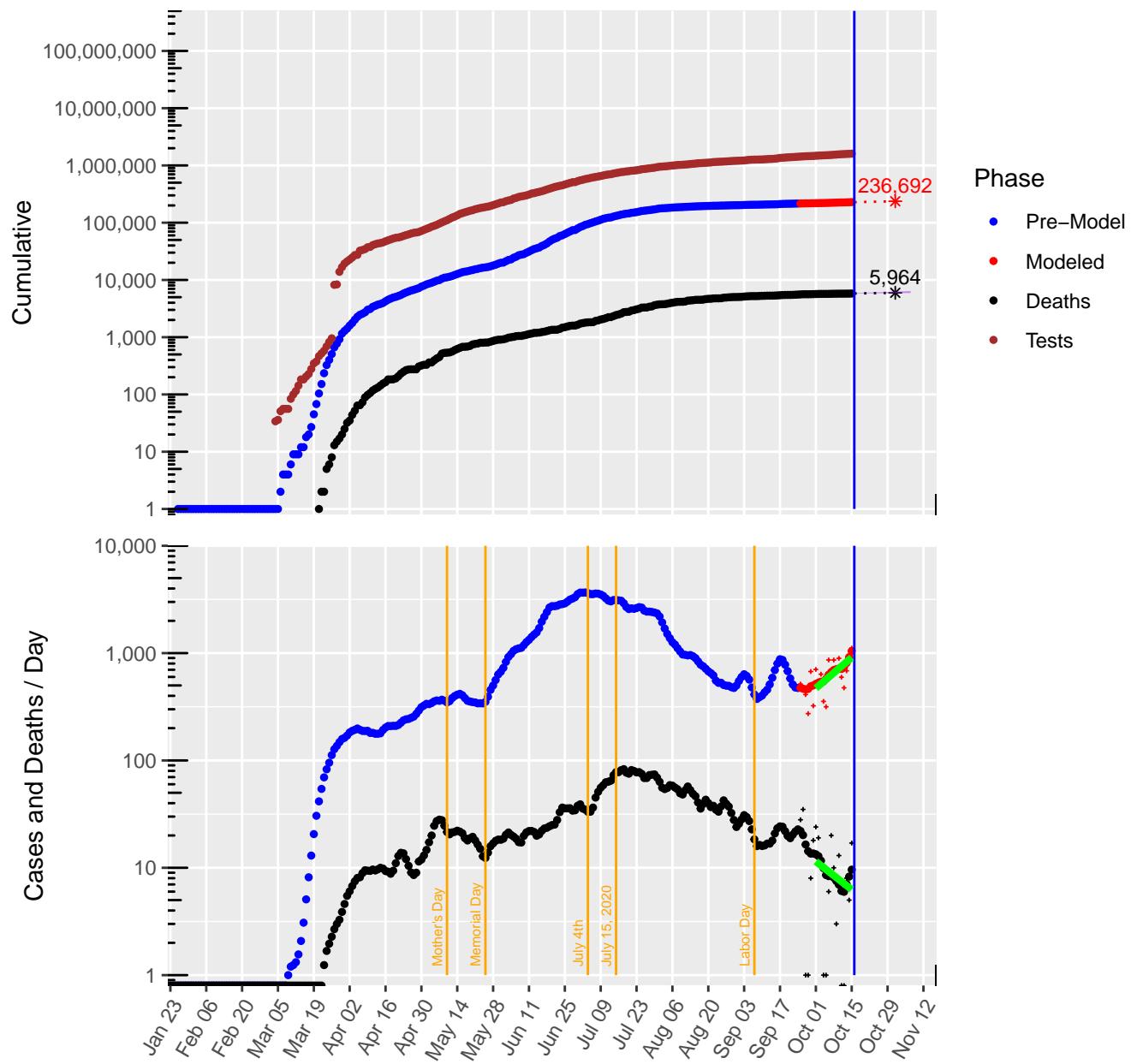
# Alabama projection as of 2020-10-16



# Alaska projection as of 2020-10-16

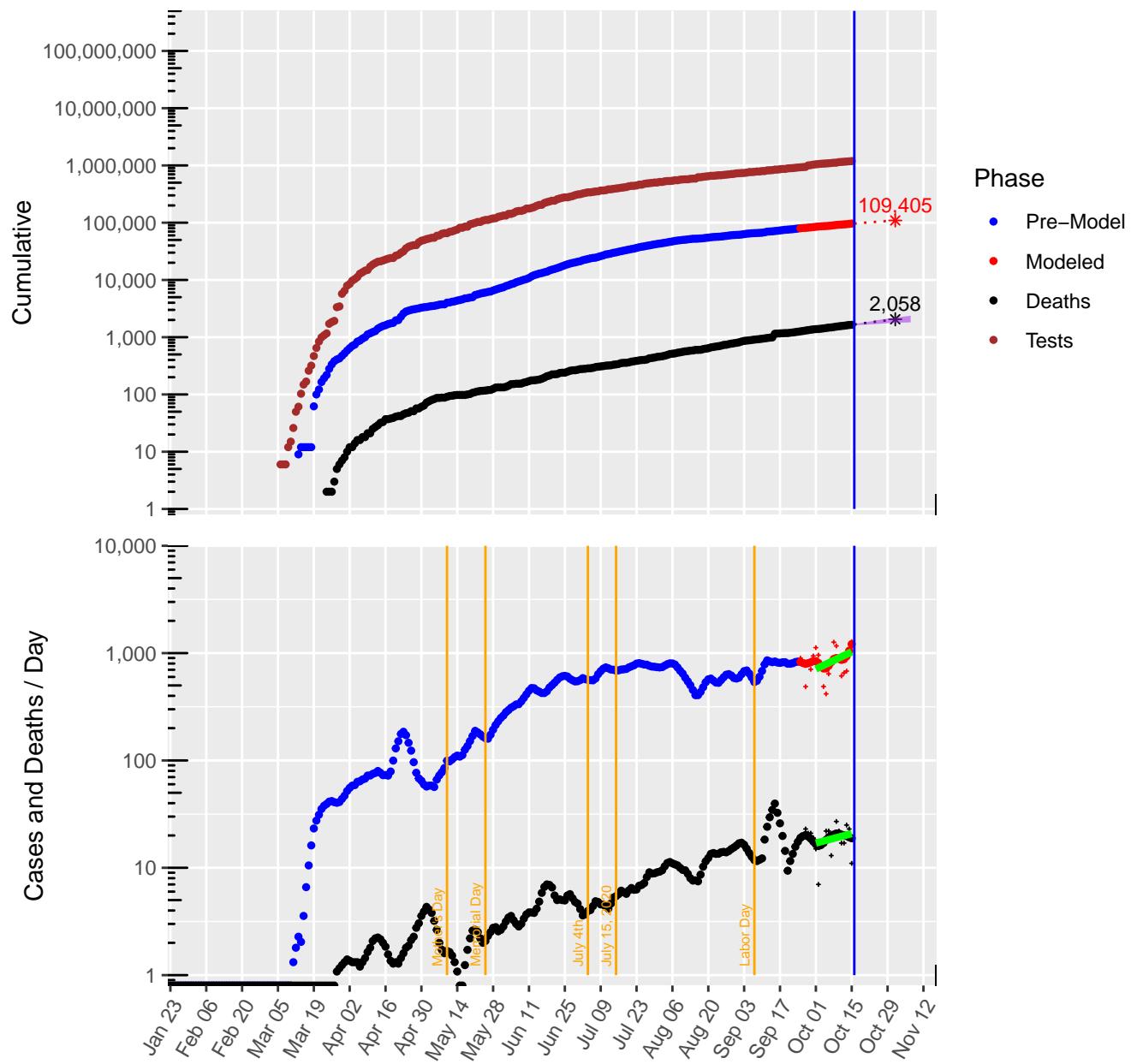


# Arizona projection as of 2020-10-16

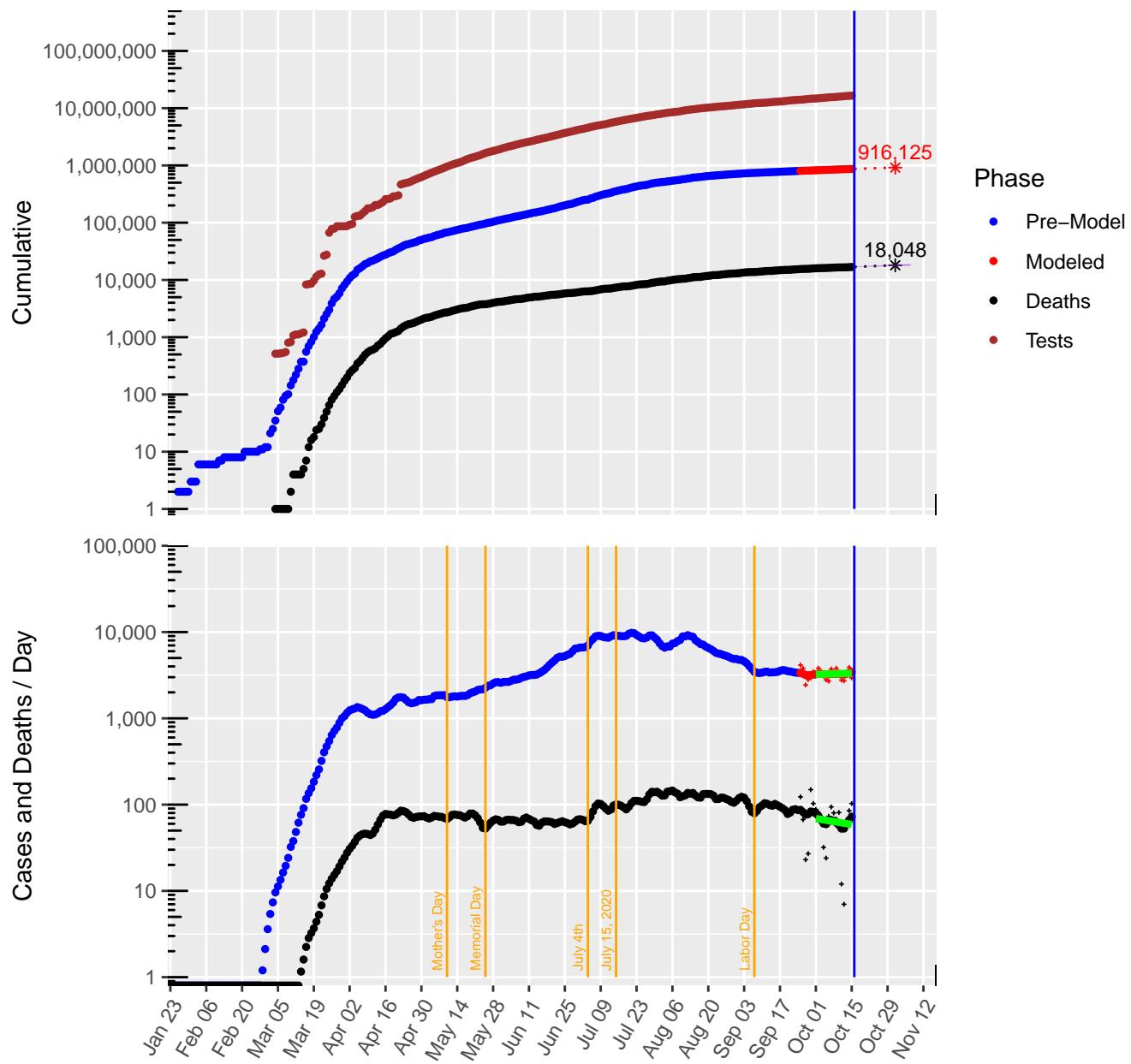


113) -- Deaths: 5,789 (17) -- Case Mortality: 2.5% -- Daily Change: +4.5% Cases, -4.2% Deaths

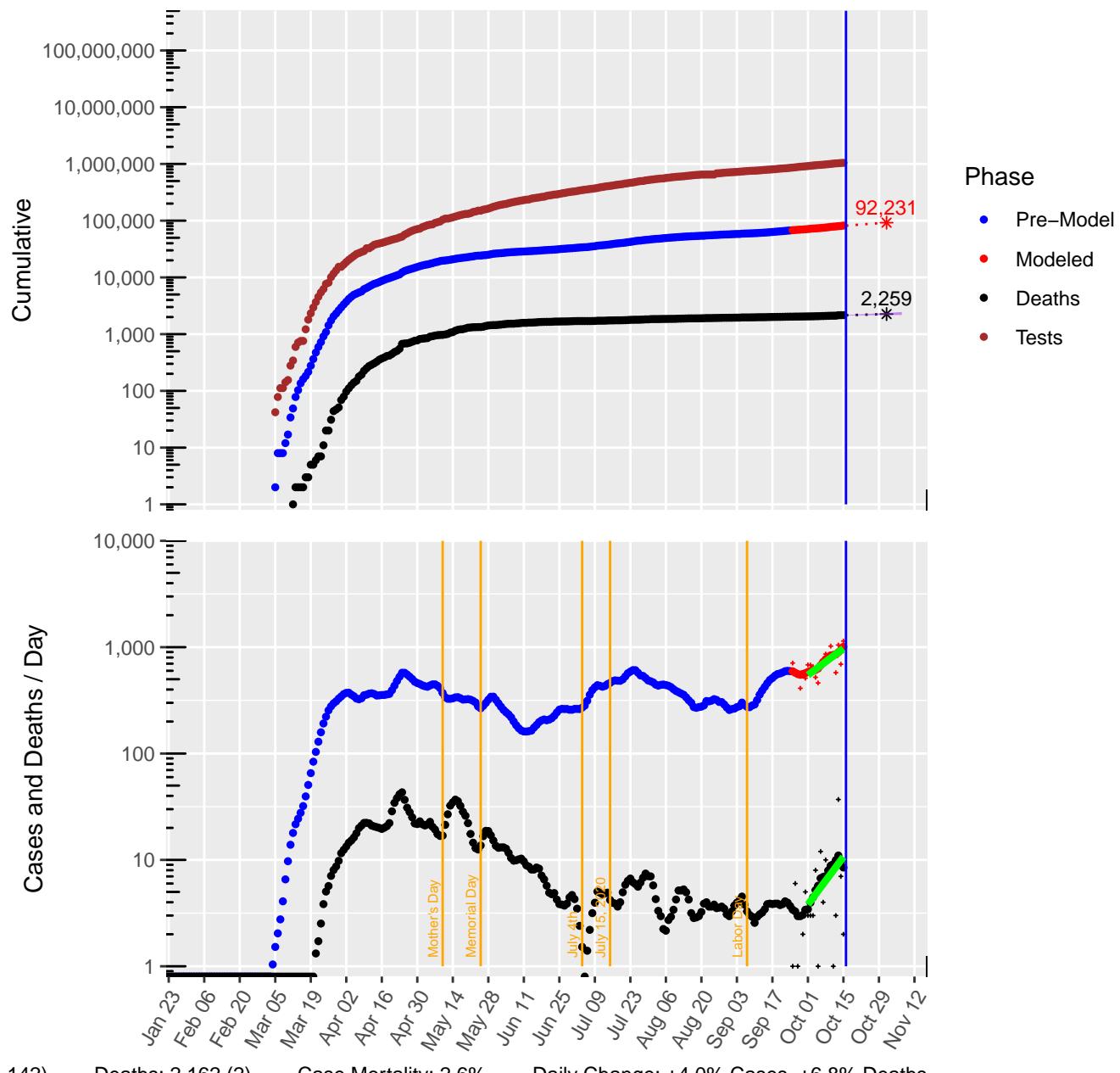
# Arkansas projection as of 2020-10-16



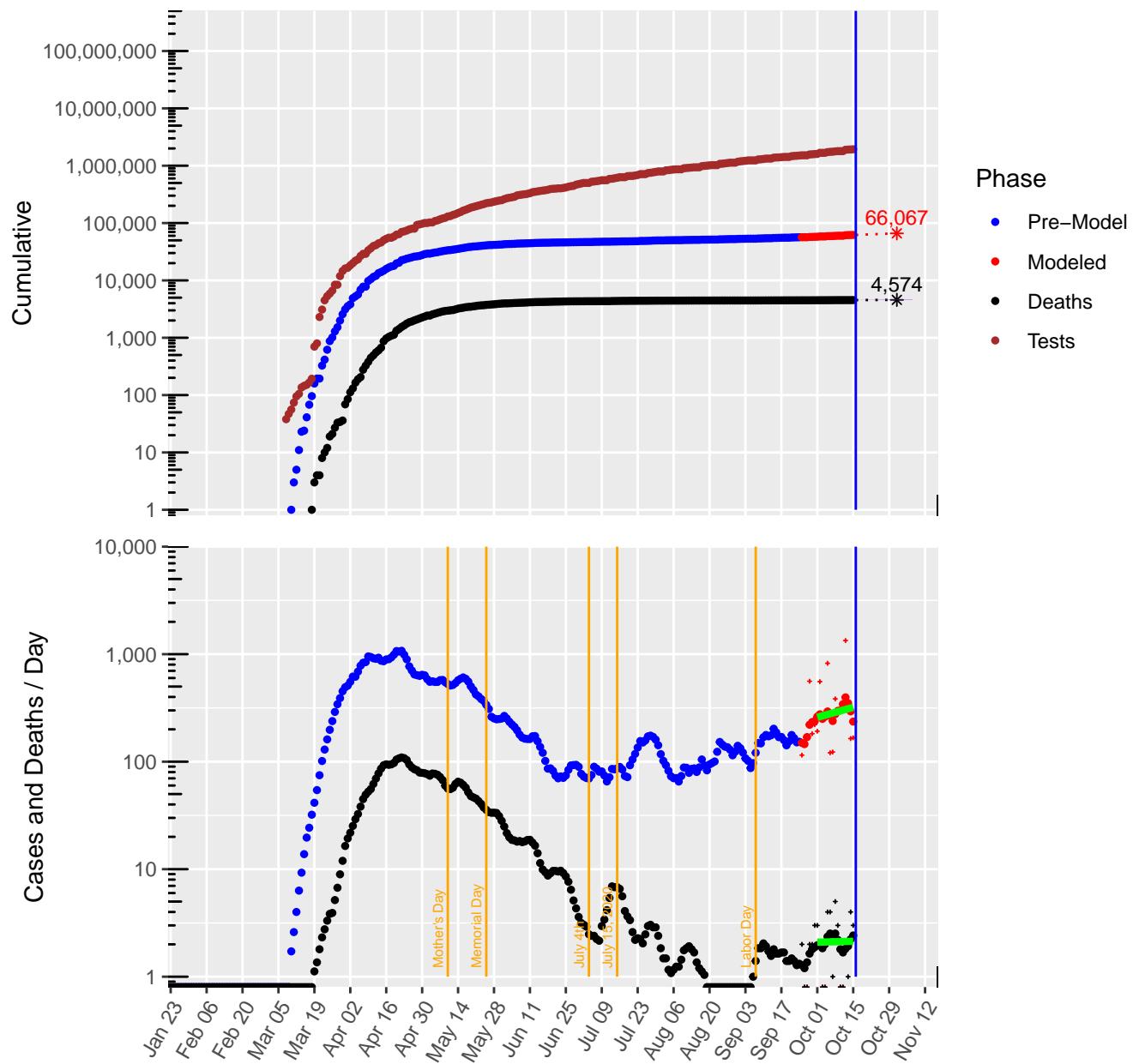
# California projection as of 2020-10-16



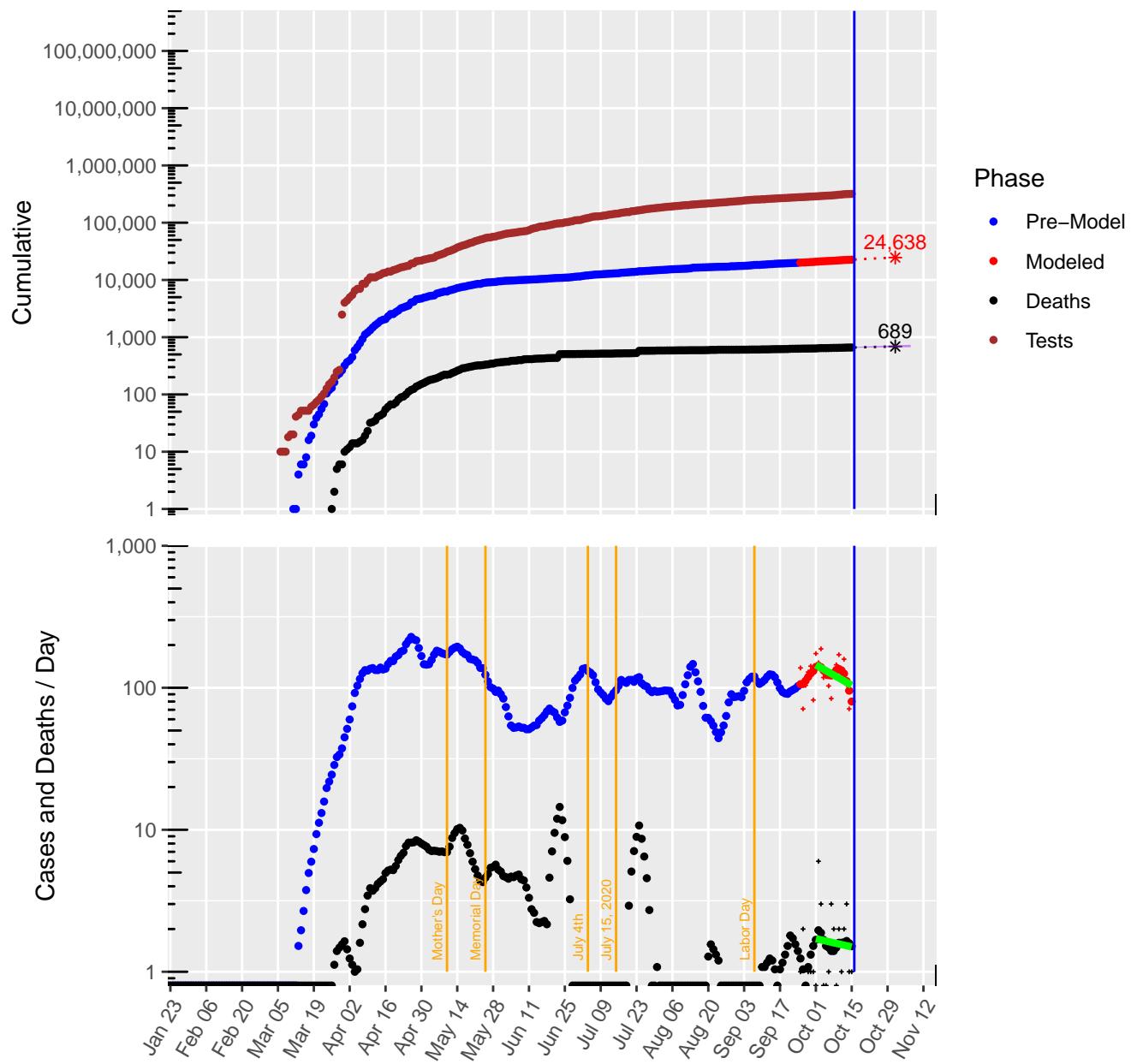
# Colorado projection as of 2020-10-16



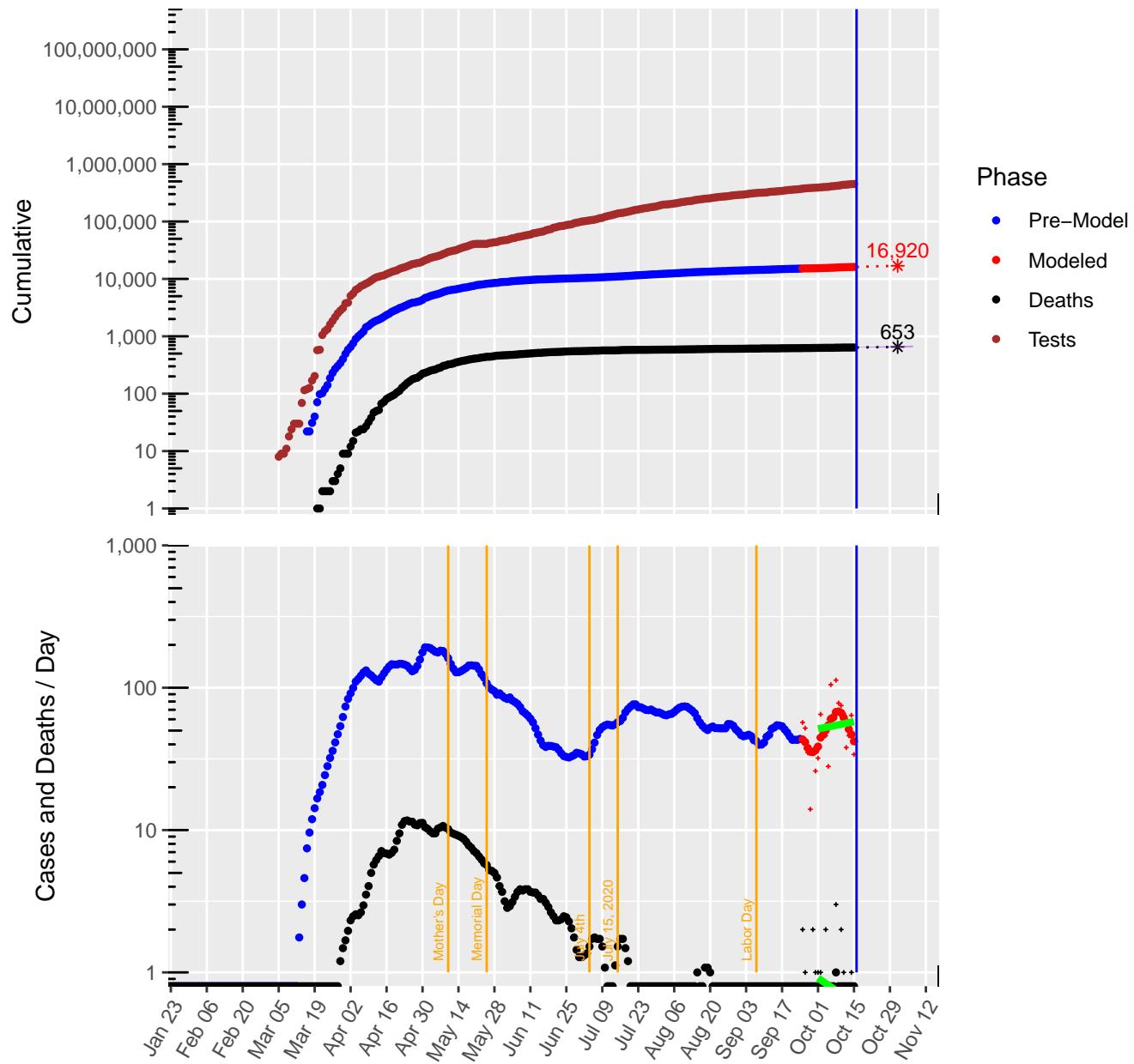
# Connecticut projection as of 2020-10-16



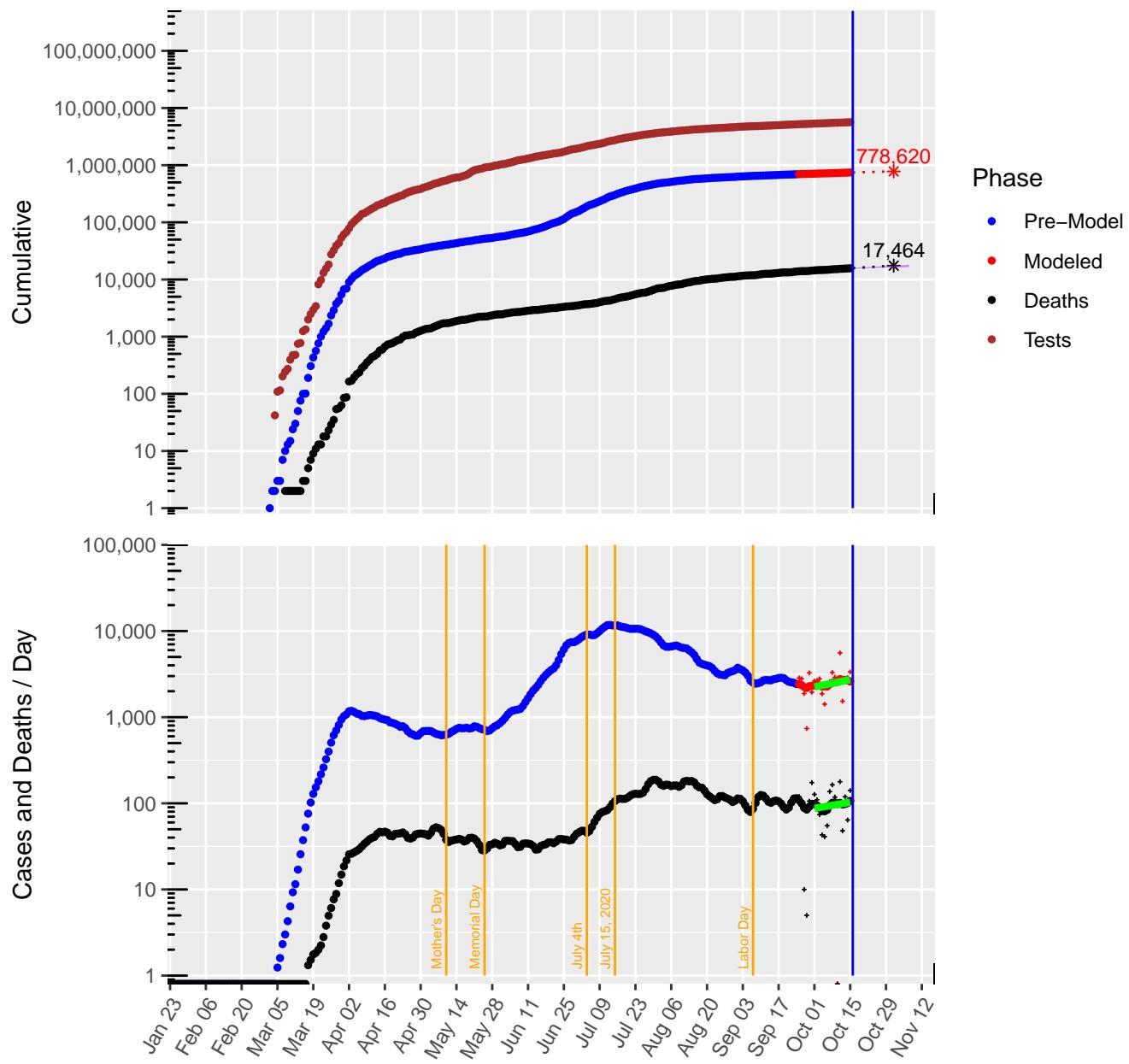
# Delaware projection as of 2020-10-16



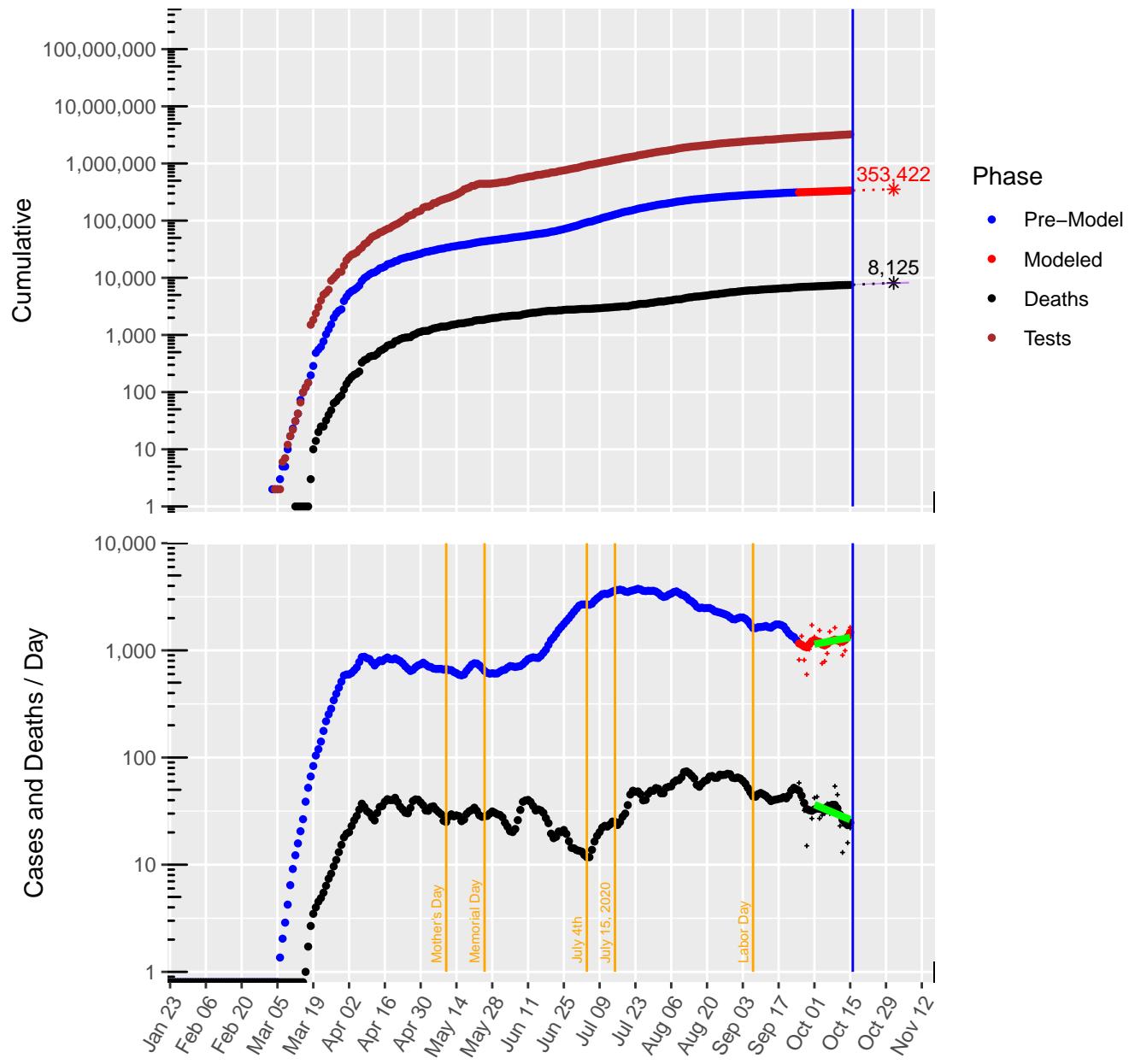
# District of Columbia projection as of 2020-10-16



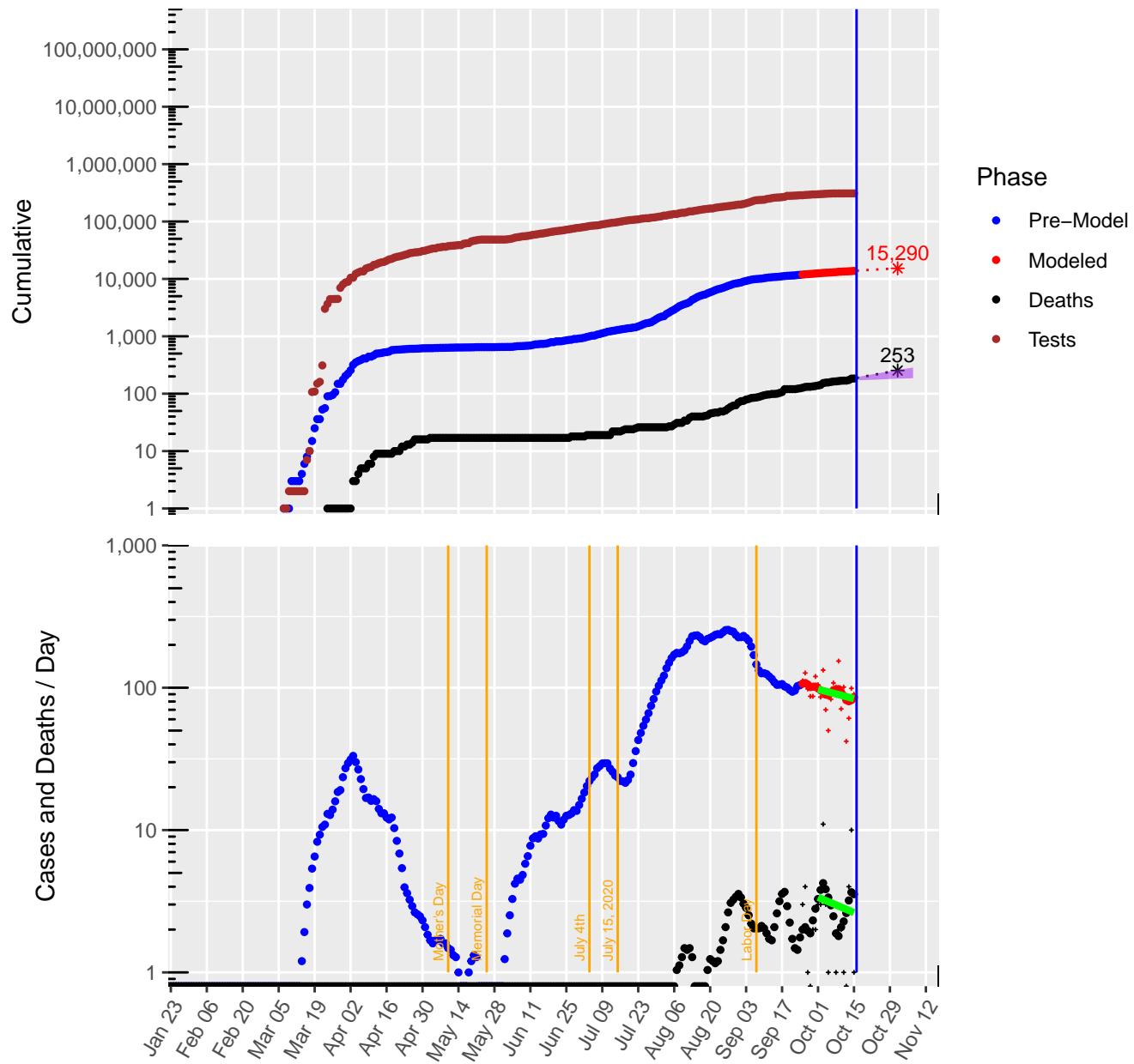
# Florida projection as of 2020-10-16



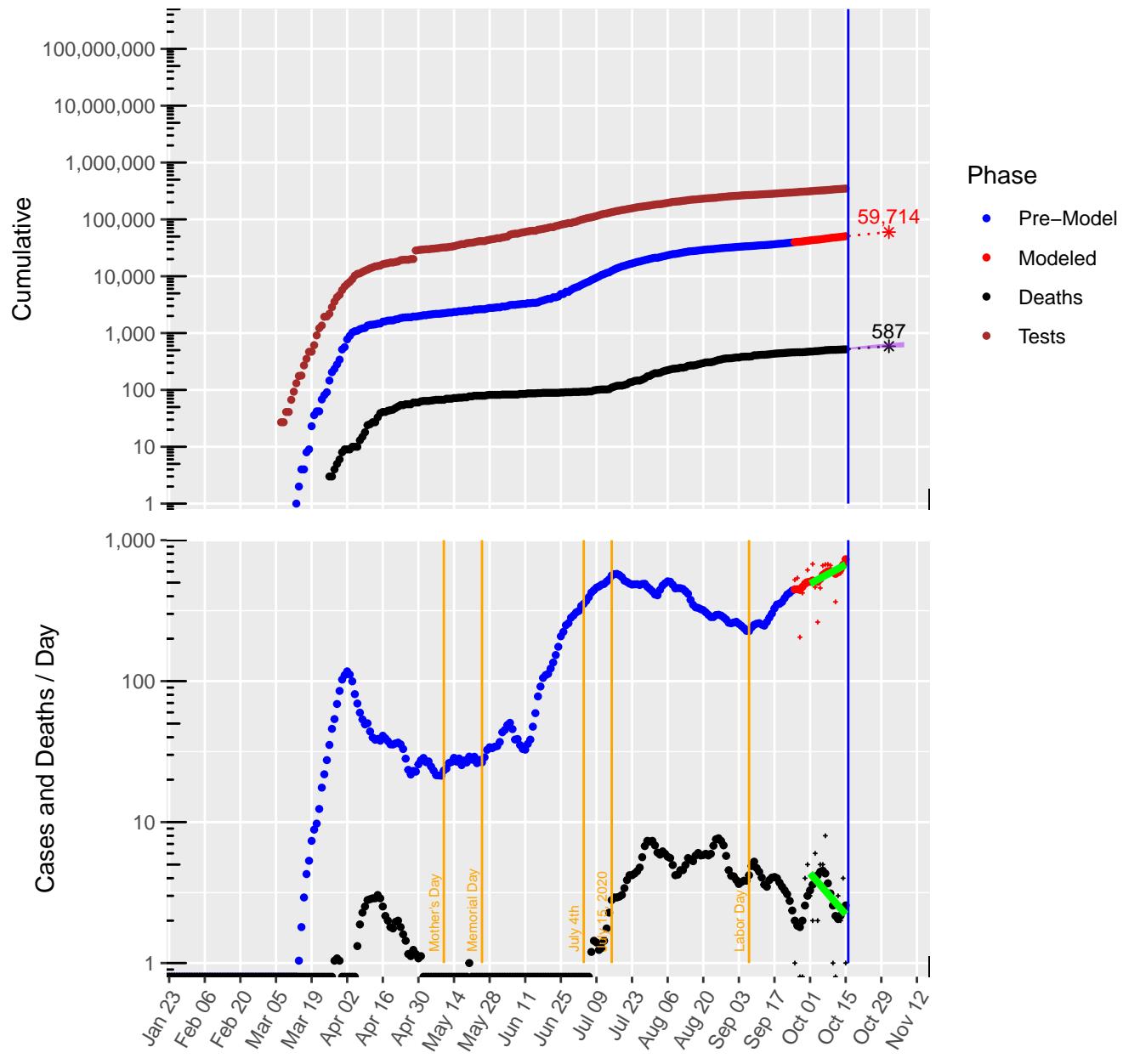
# Georgia projection as of 2020-10-16



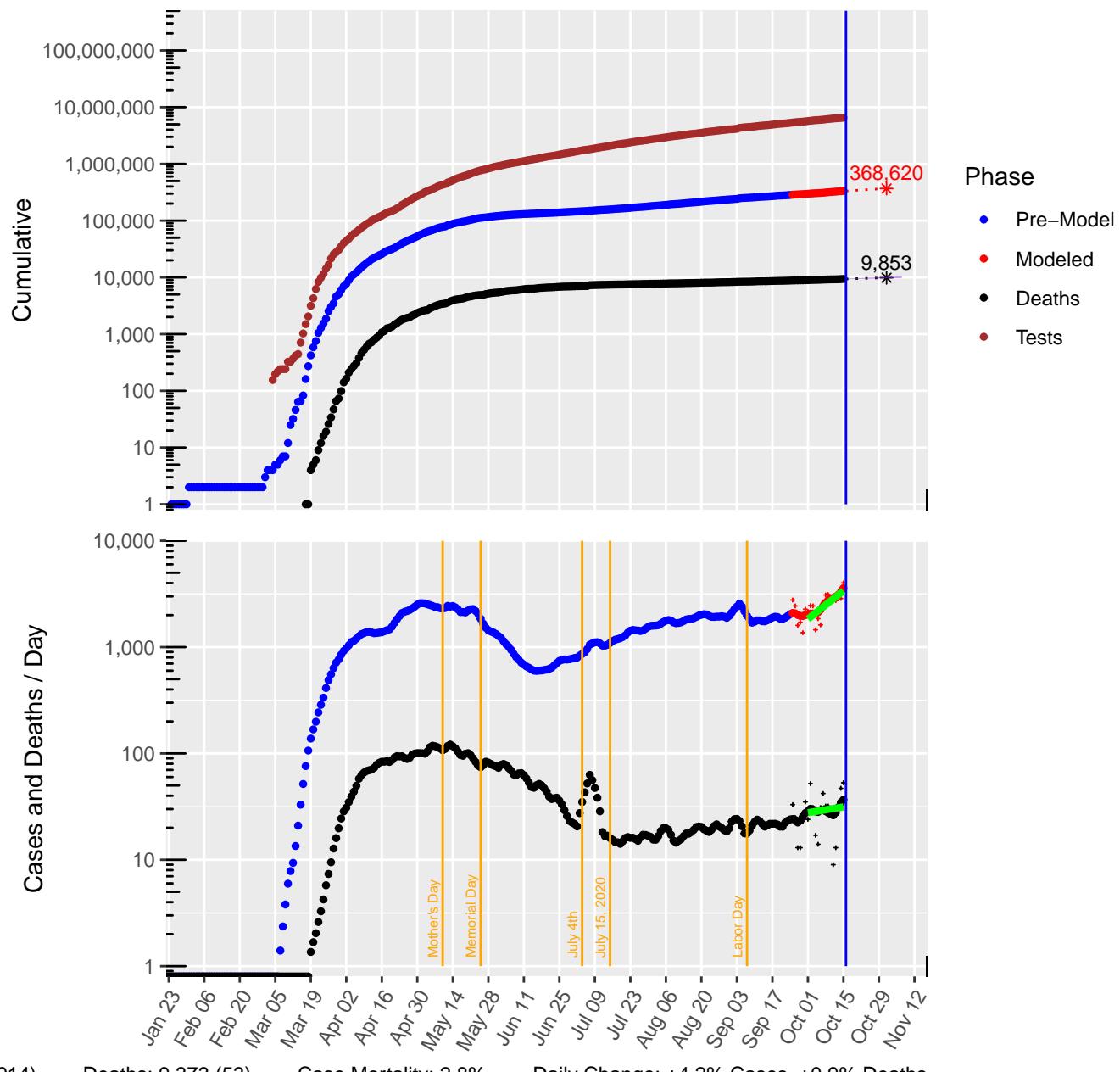
# Hawaii projection as of 2020-10-16



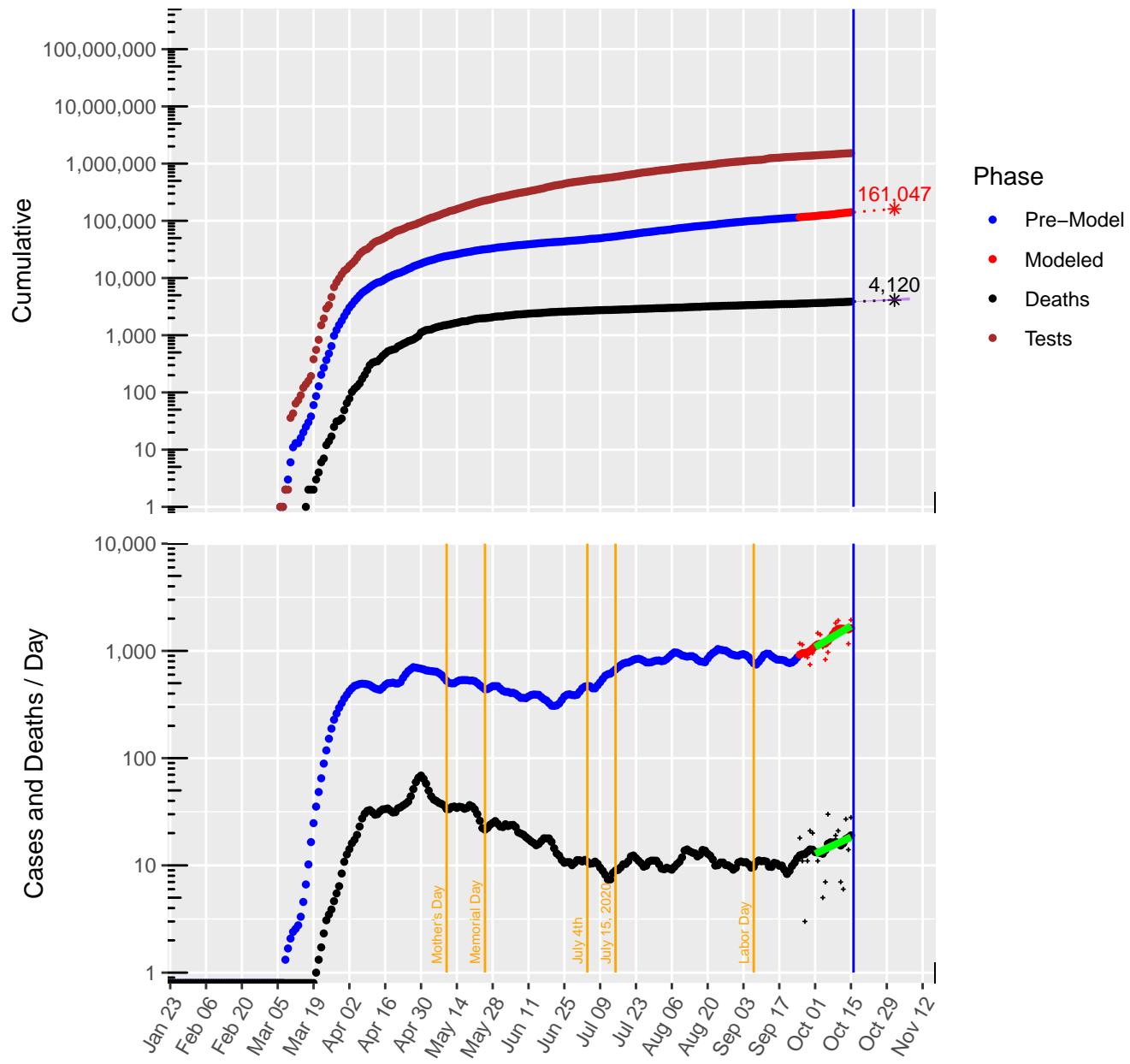
# Idaho projection as of 2020-10-16



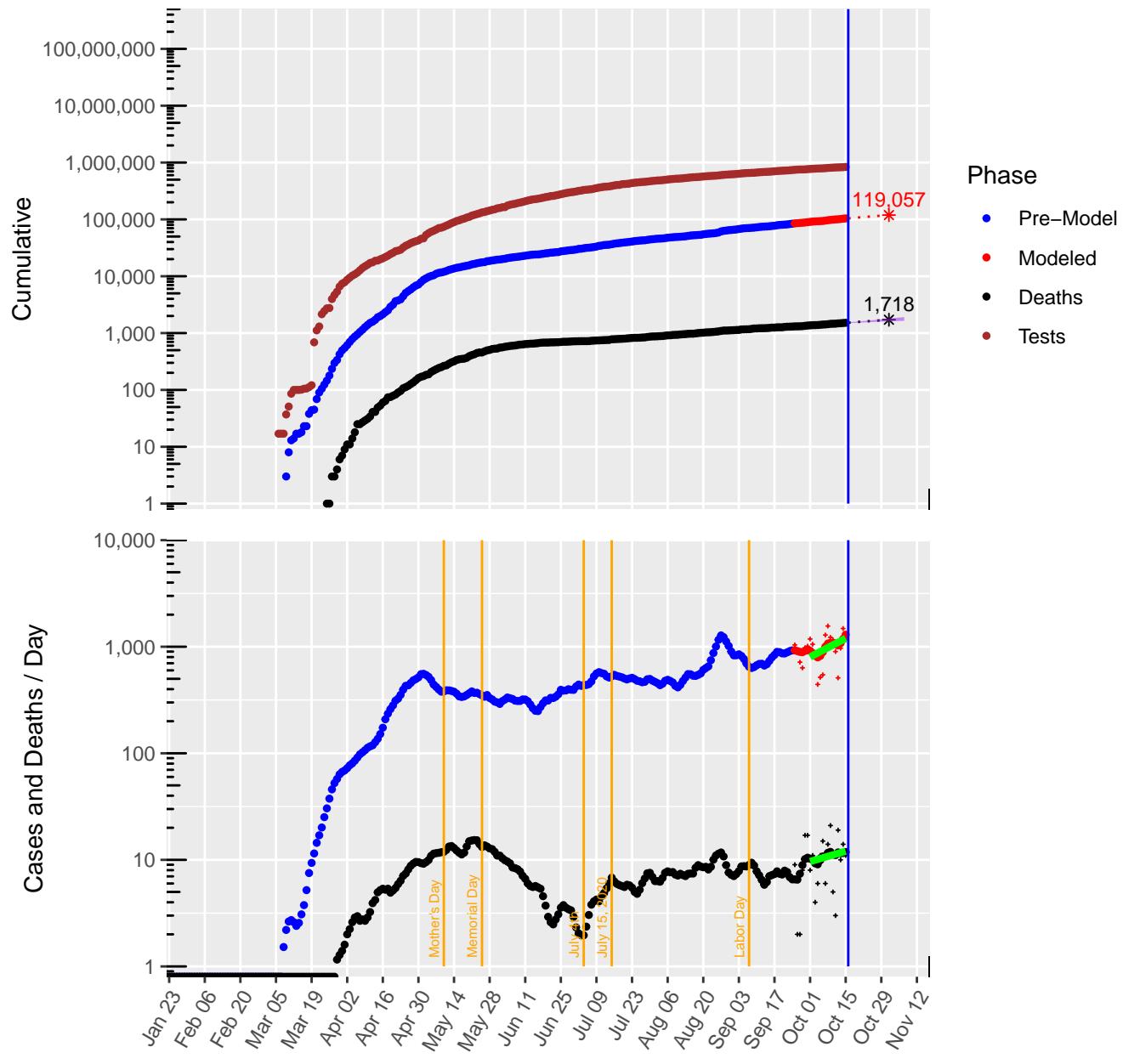
# Illinois projection as of 2020-10-16



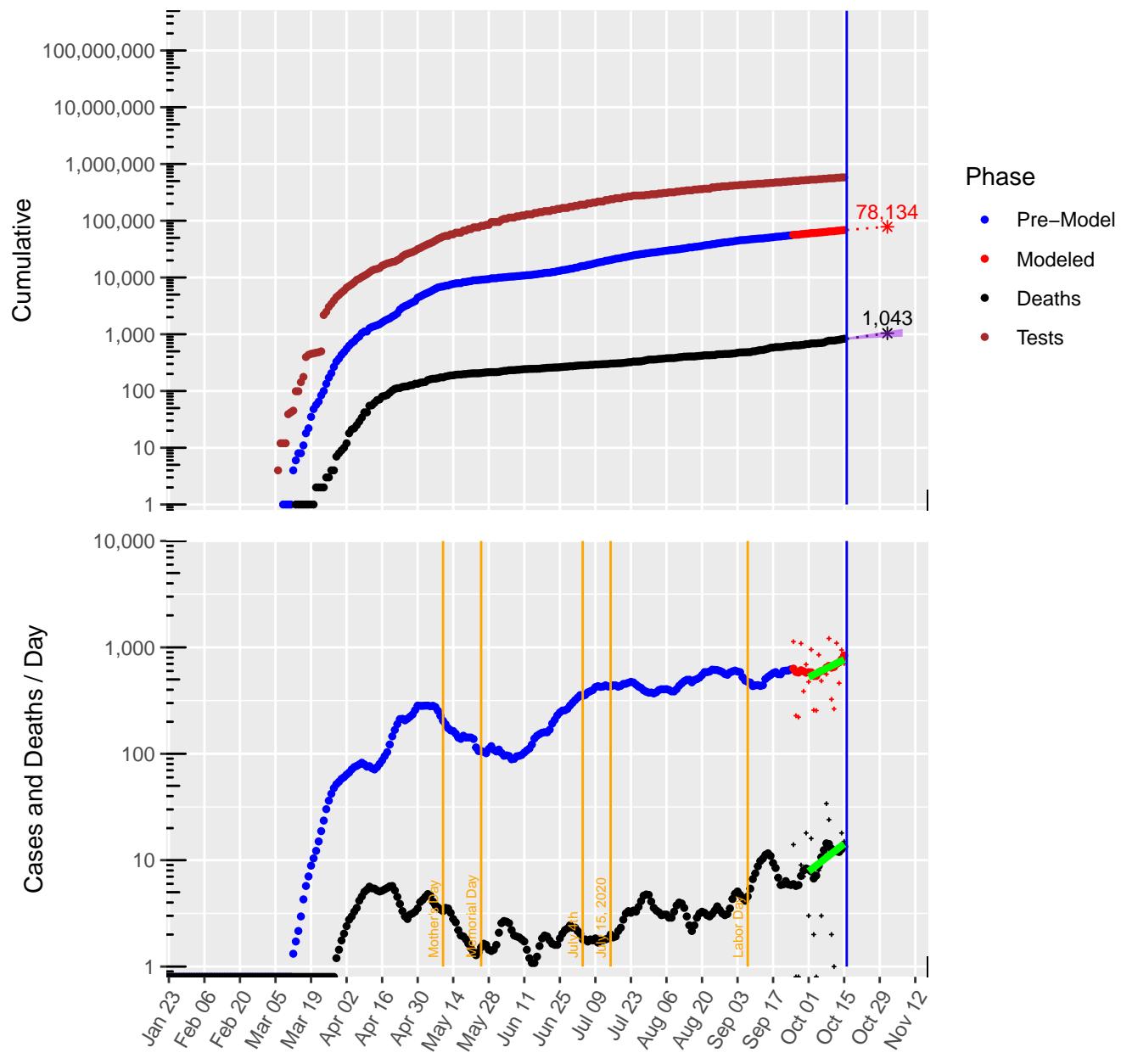
# Indiana projection as of 2020-10-16



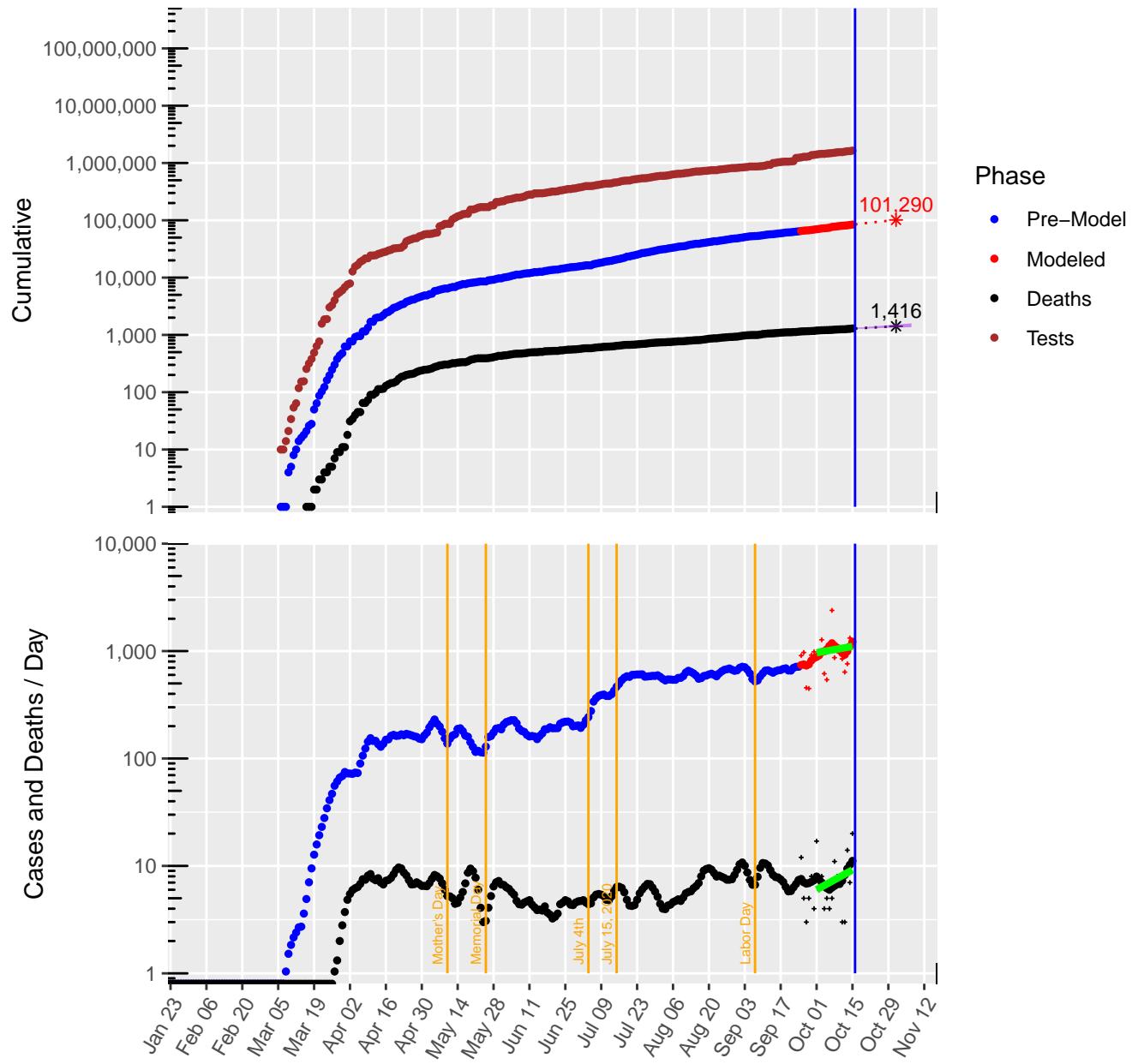
# Iowa projection as of 2020-10-16



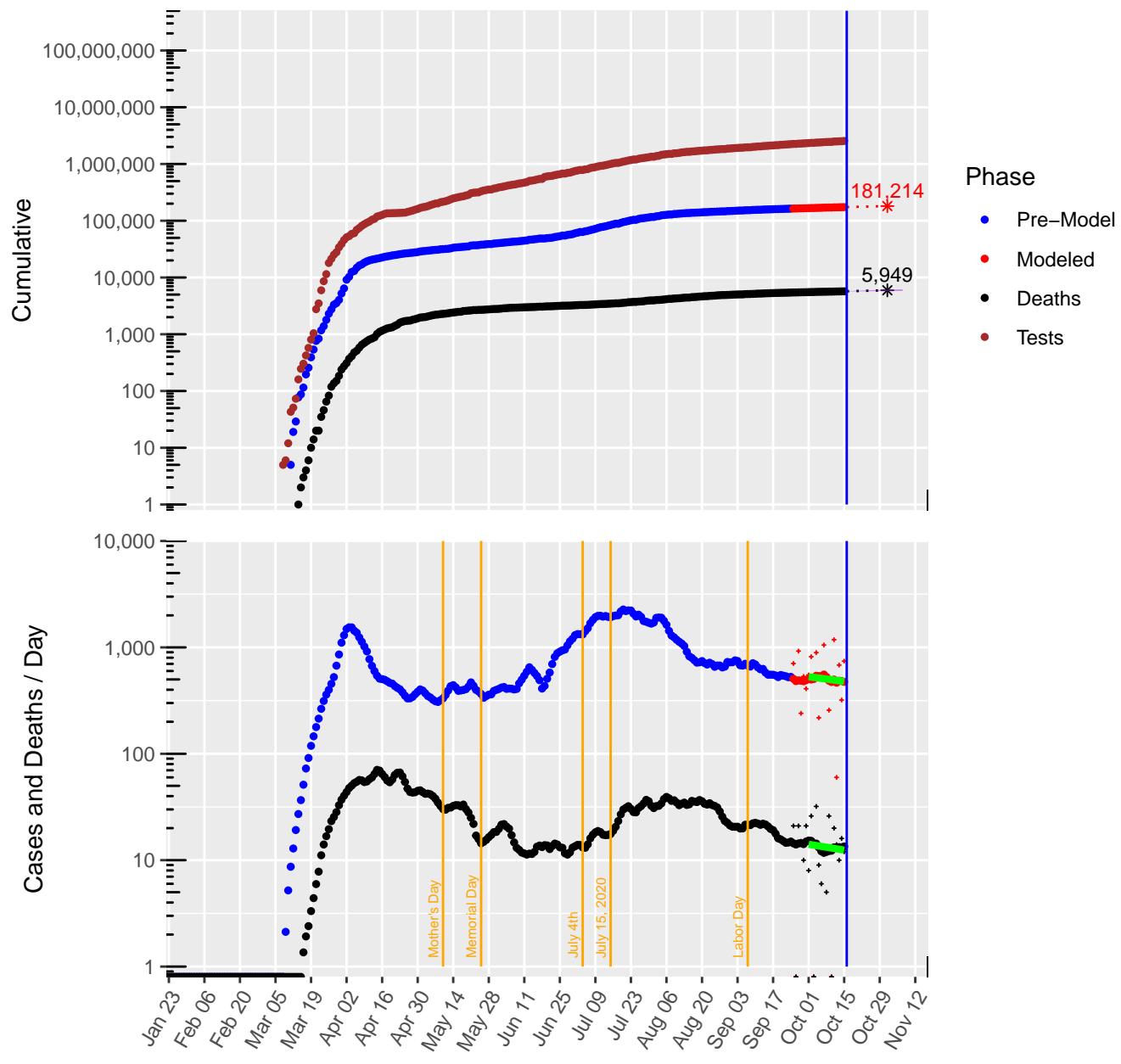
# Kansas projection as of 2020-10-16



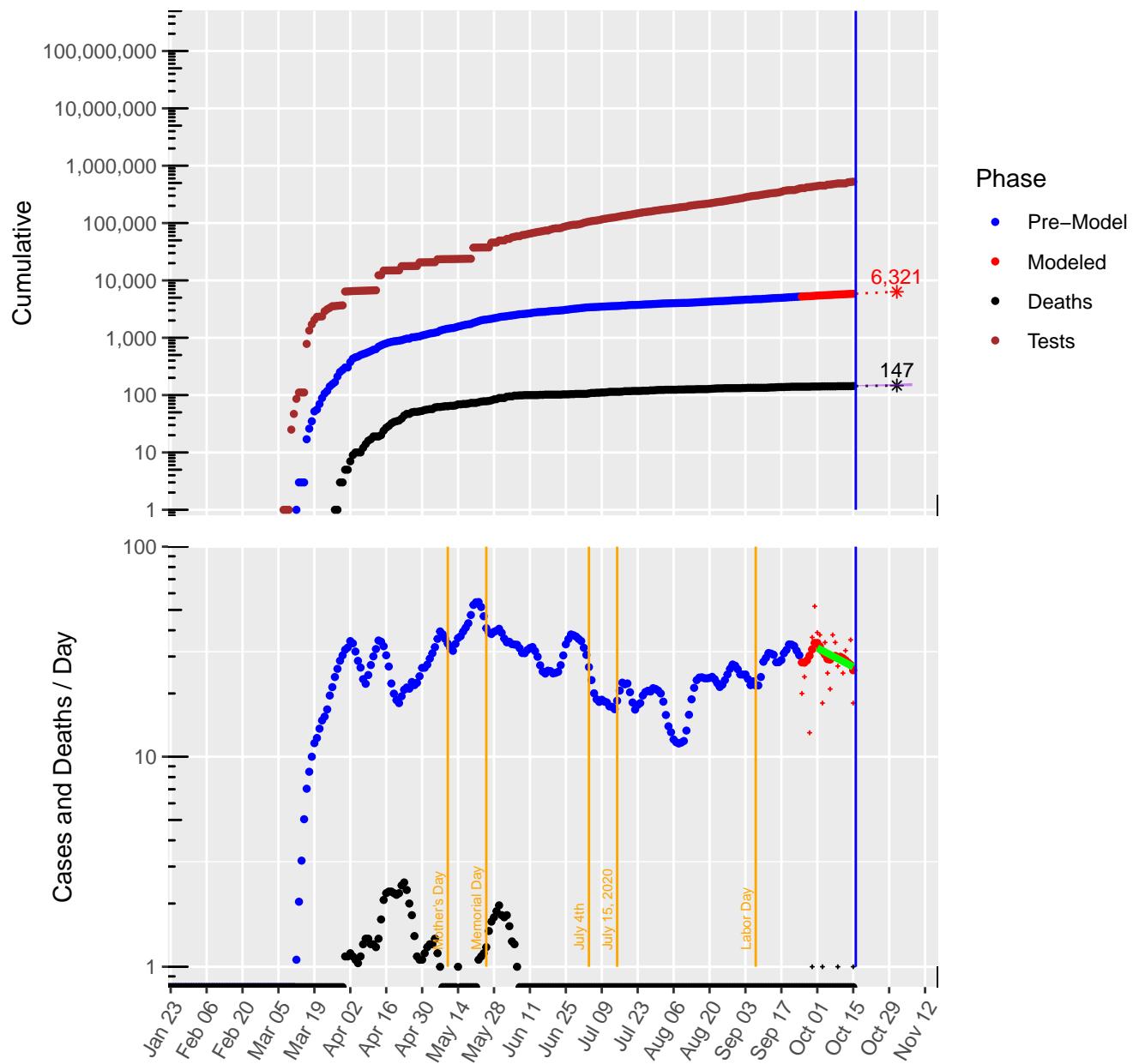
# Kentucky projection as of 2020-10-16



# Louisiana projection as of 2020-10-16

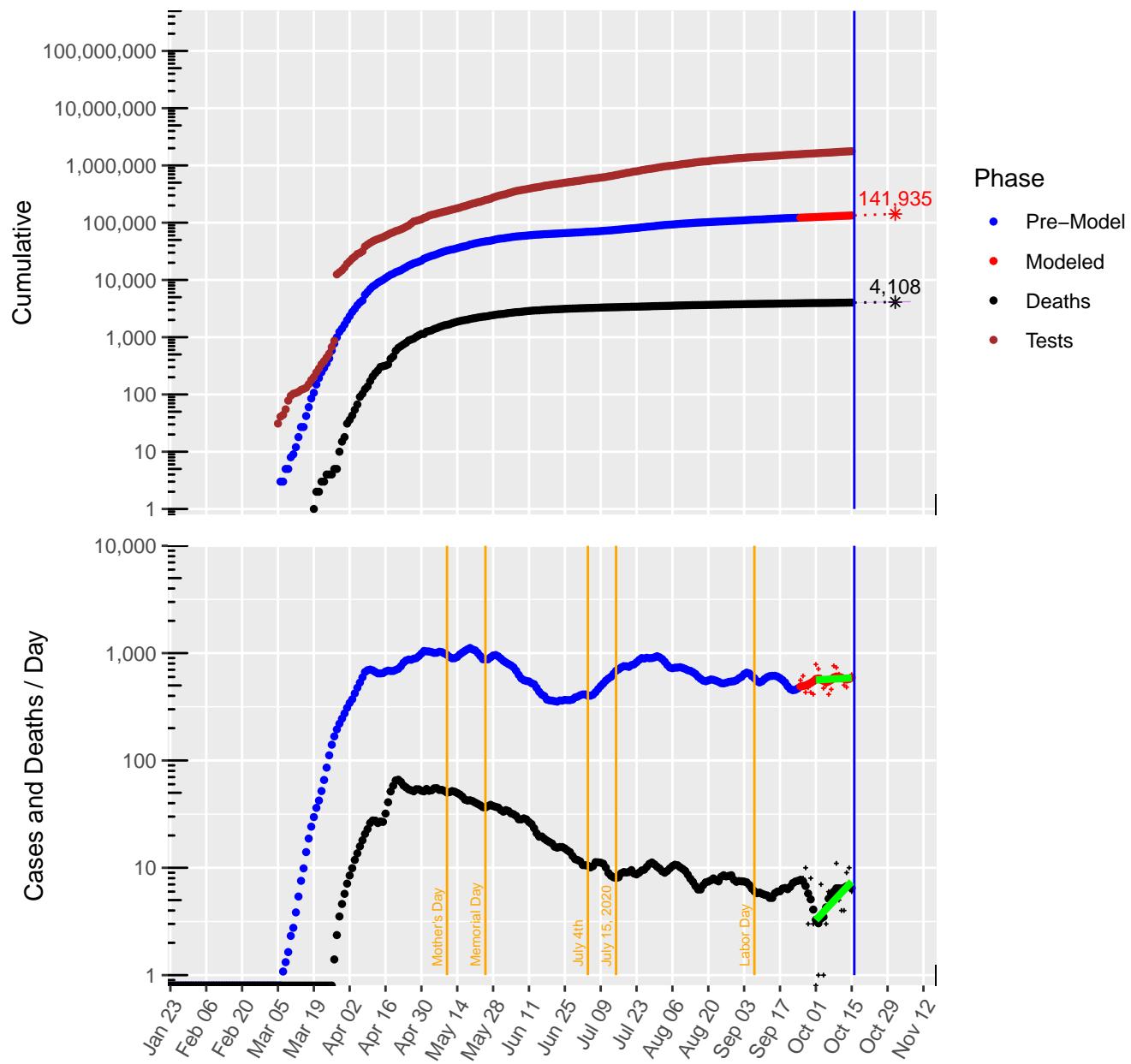


# Maine projection as of 2020-10-16



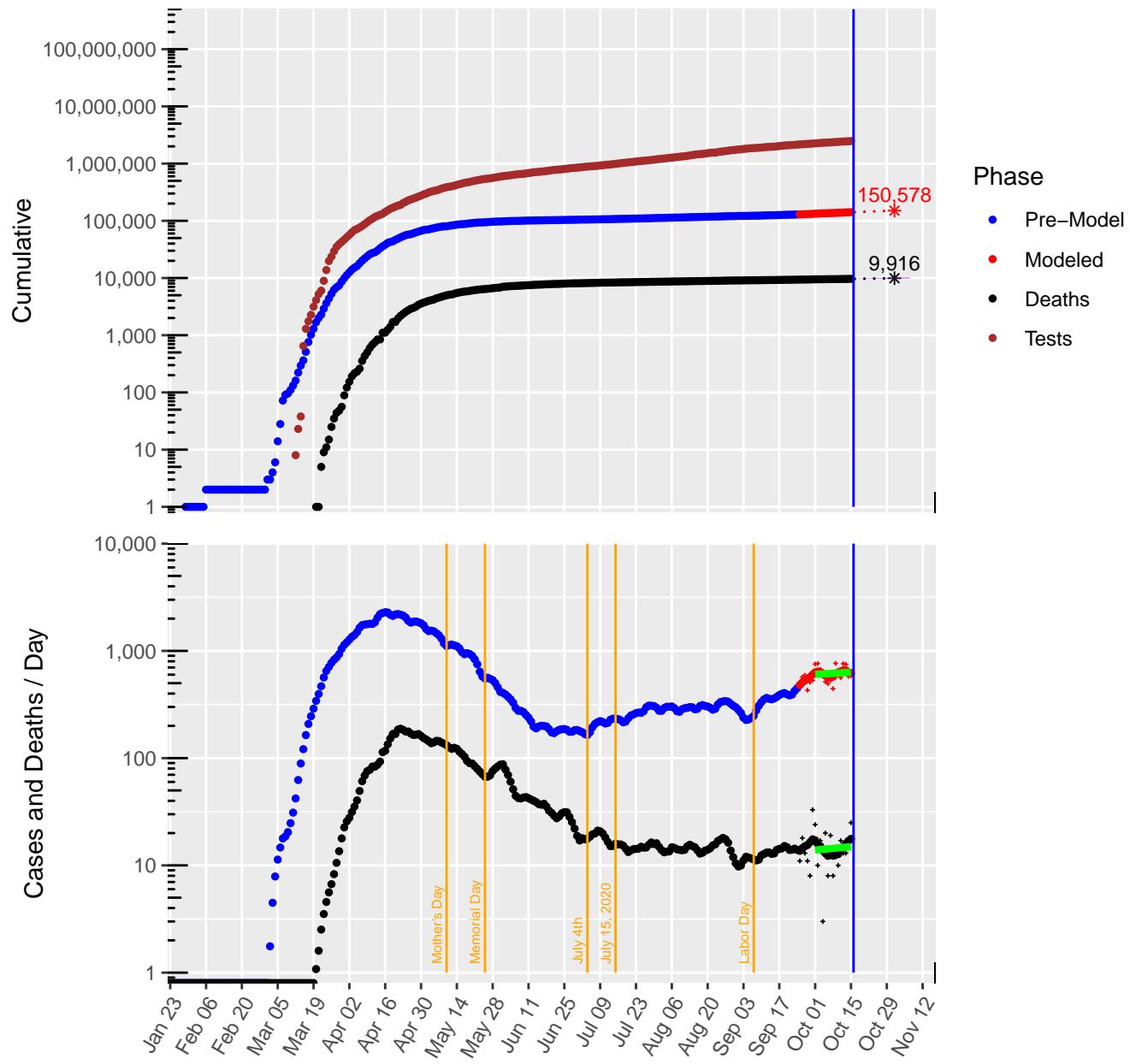
34 (18) — Deaths: 144 (1) — Case Mortality: 2.5% — Daily Change: -1.5% Cases, +1.4% Deaths

# Maryland projection as of 2020-10-16

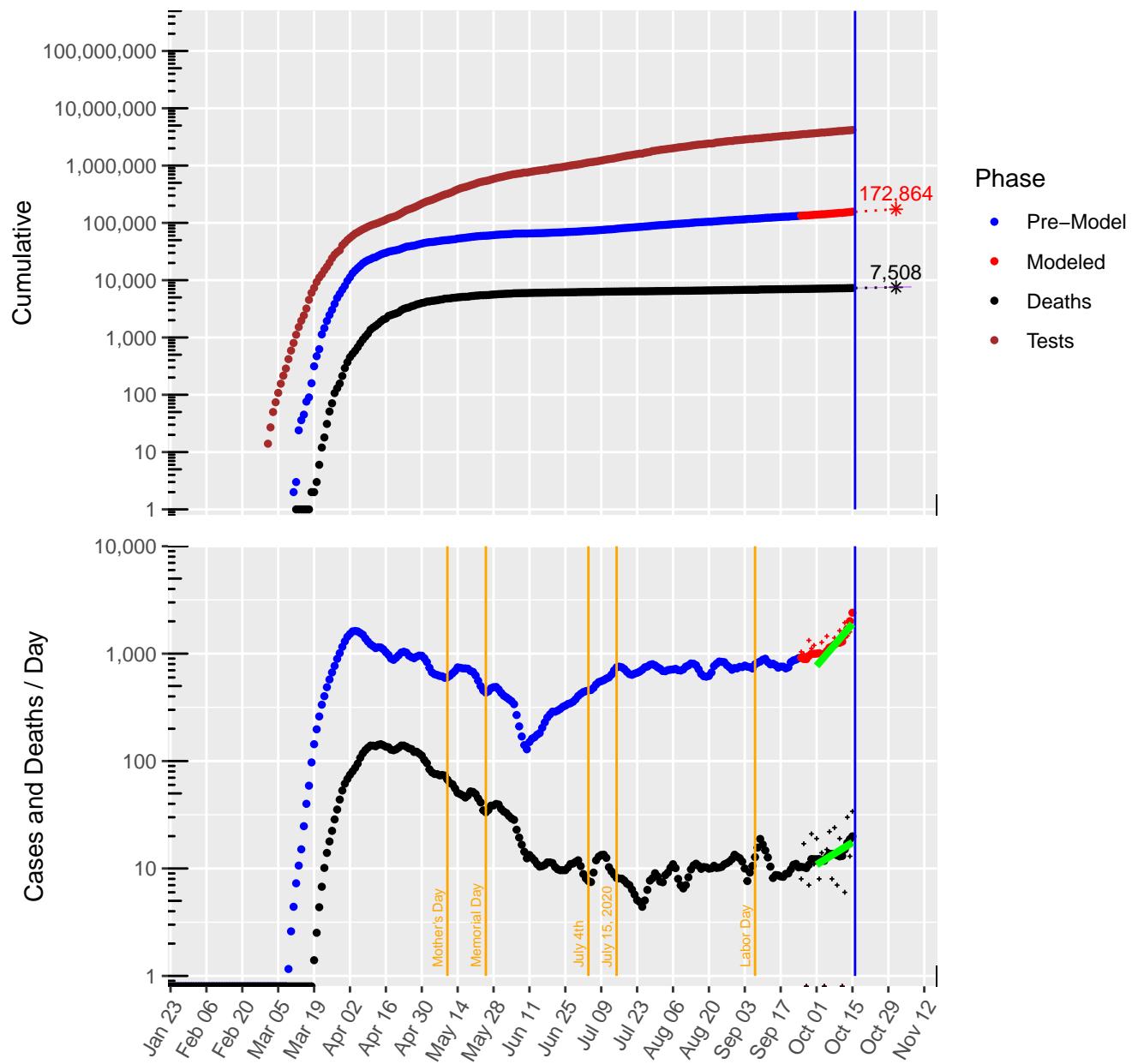


(630) -- Deaths: 4,028 (6) -- Case Mortality: 3.0% -- Daily Change: +0.3% Cases, +5.5% Deaths

# Massachusetts projection as of 2020-10-16

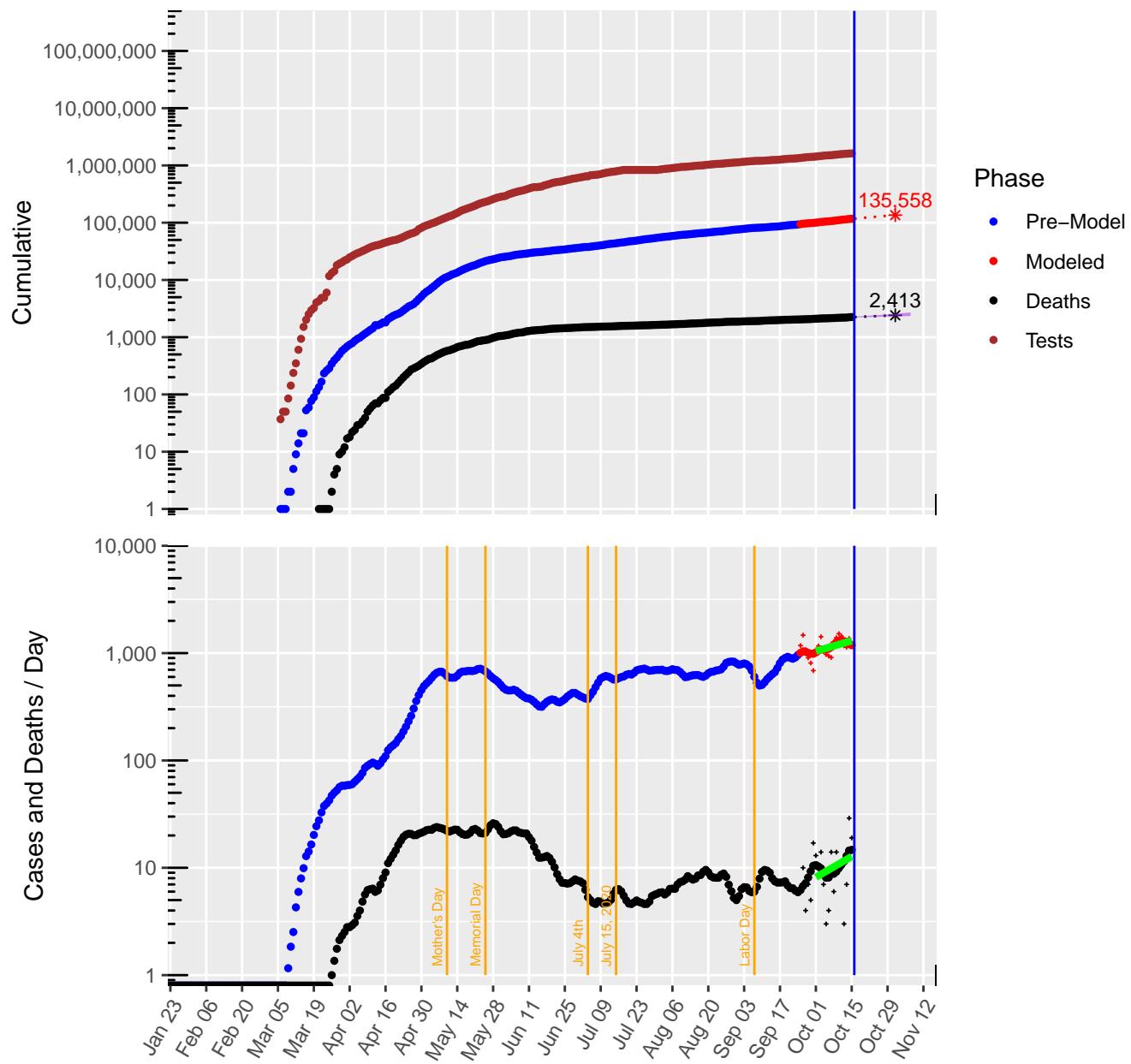


# Michigan projection as of 2020-10-16

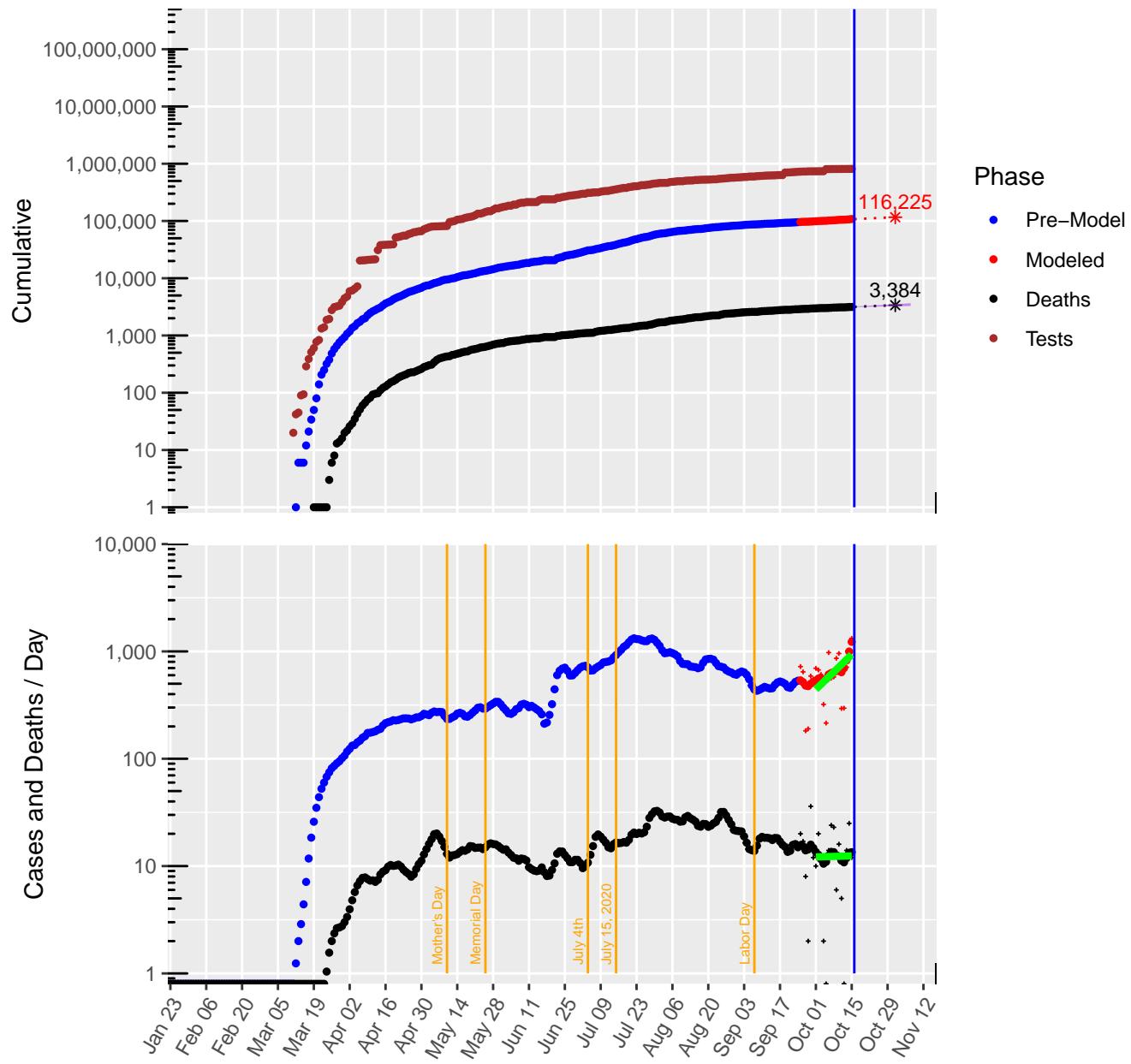


458) --- Deaths: 7,302 (34) --- Case Mortality: 4.7% --- Daily Change: +6.0% Cases, +3.3% Deaths

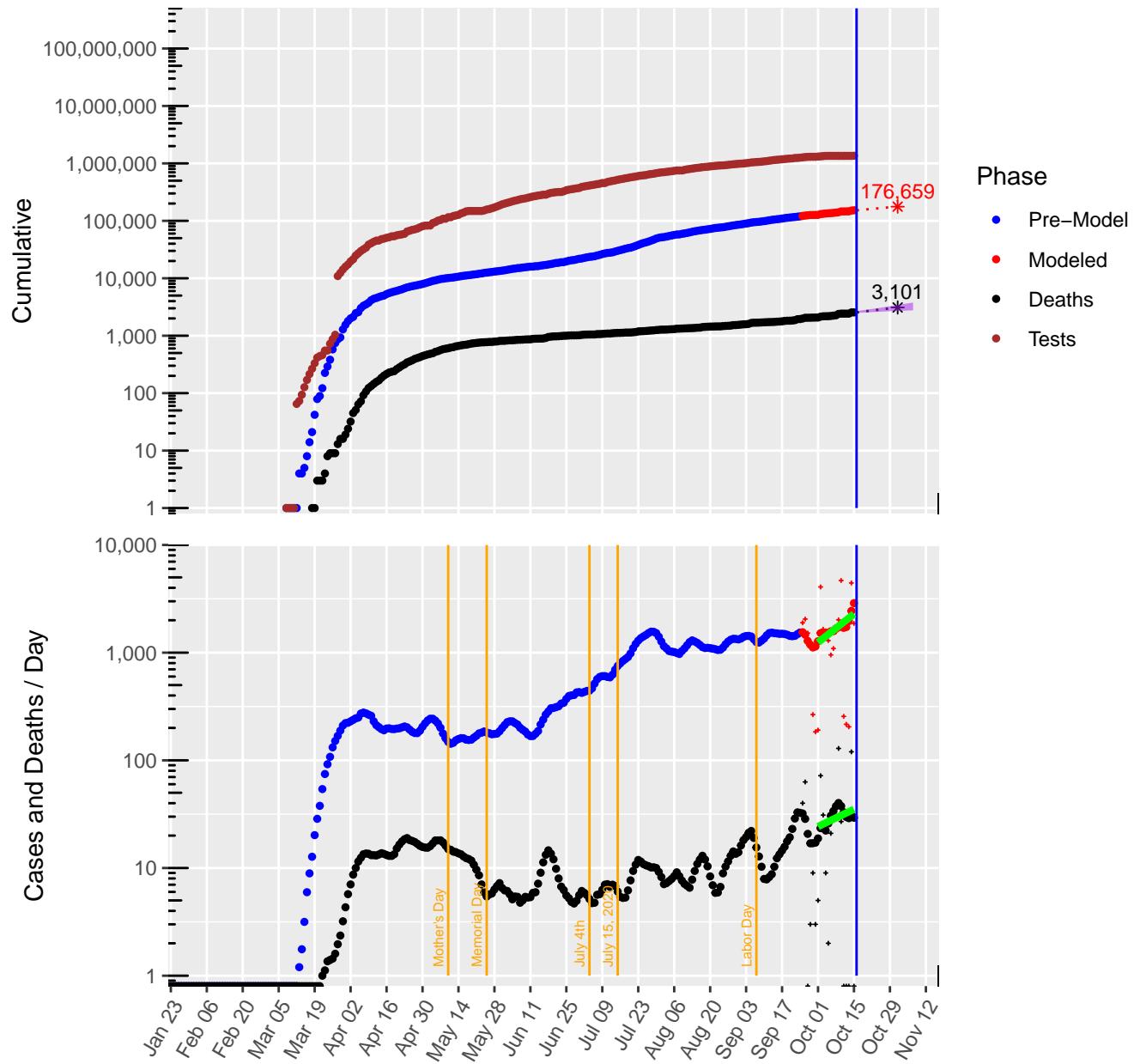
# Minnesota projection as of 2020-10-16



# Mississippi projection as of 2020-10-16

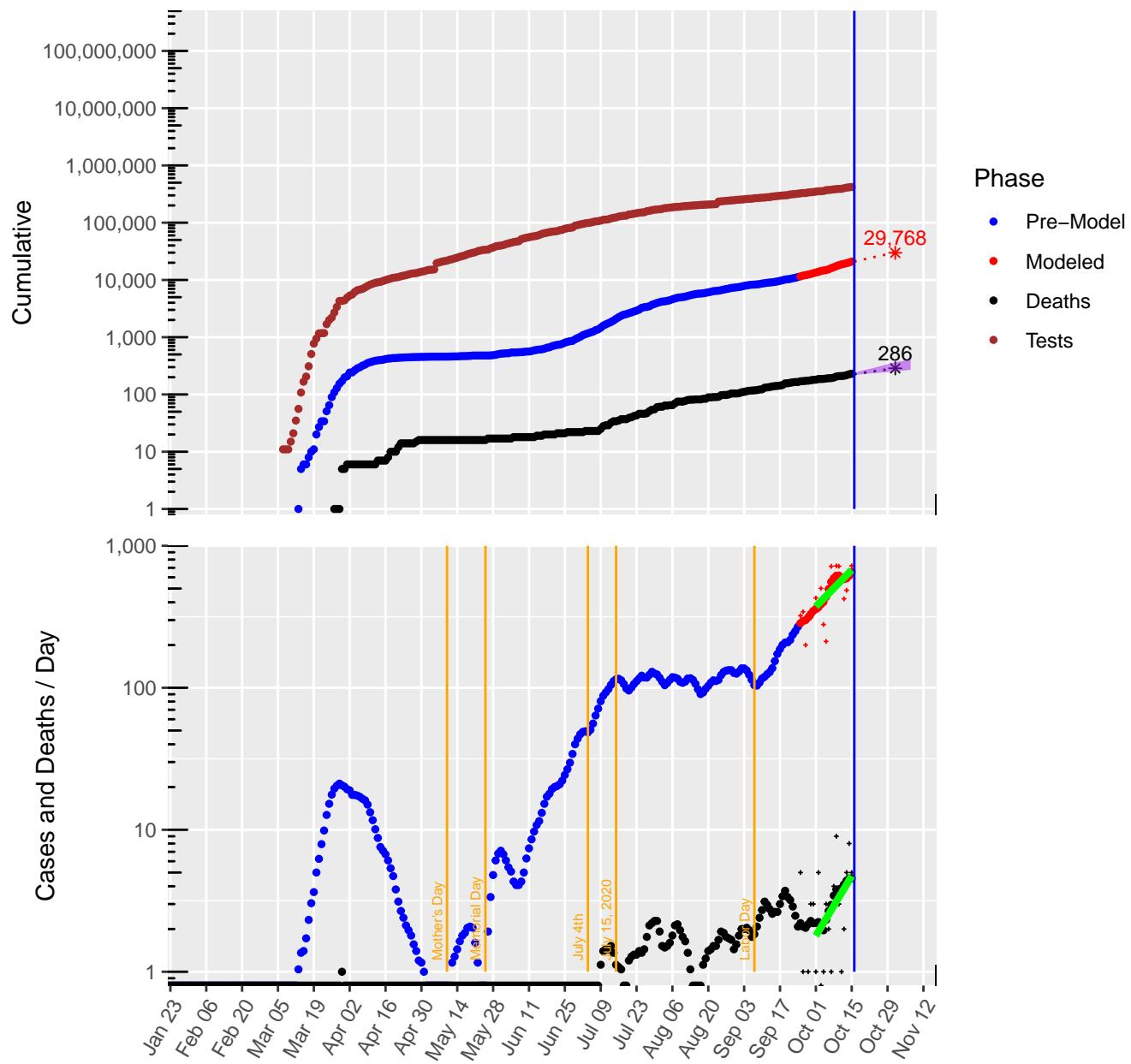


# Missouri projection as of 2020-10-16

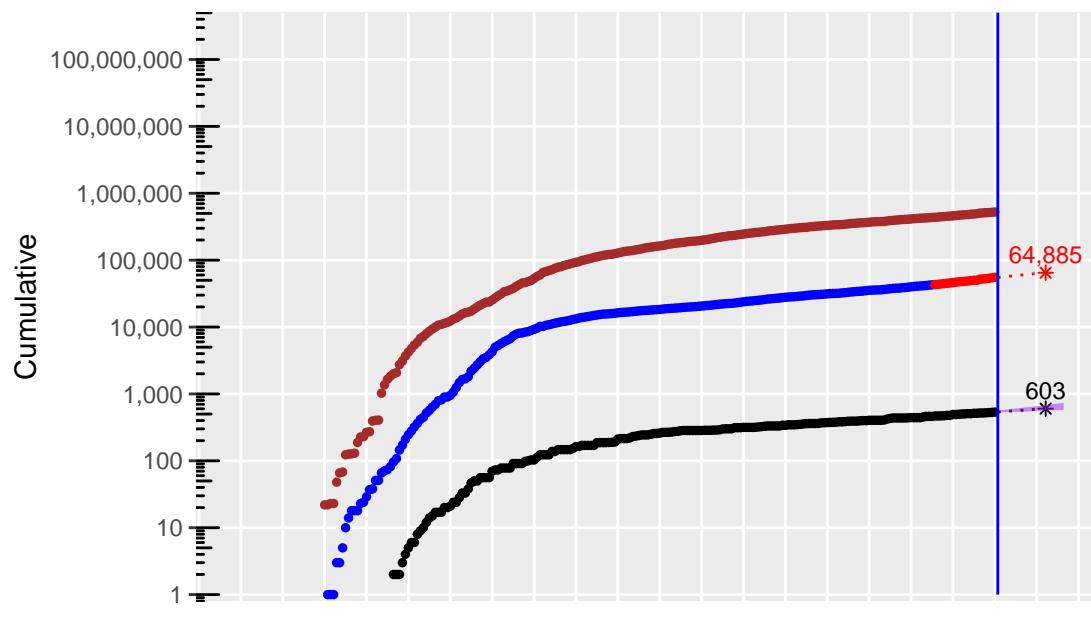


,868) -- Deaths: 2,544 (0) -- Case Mortality: 1.7% -- Daily Change: +4.2% Cases, +2.6% Deaths

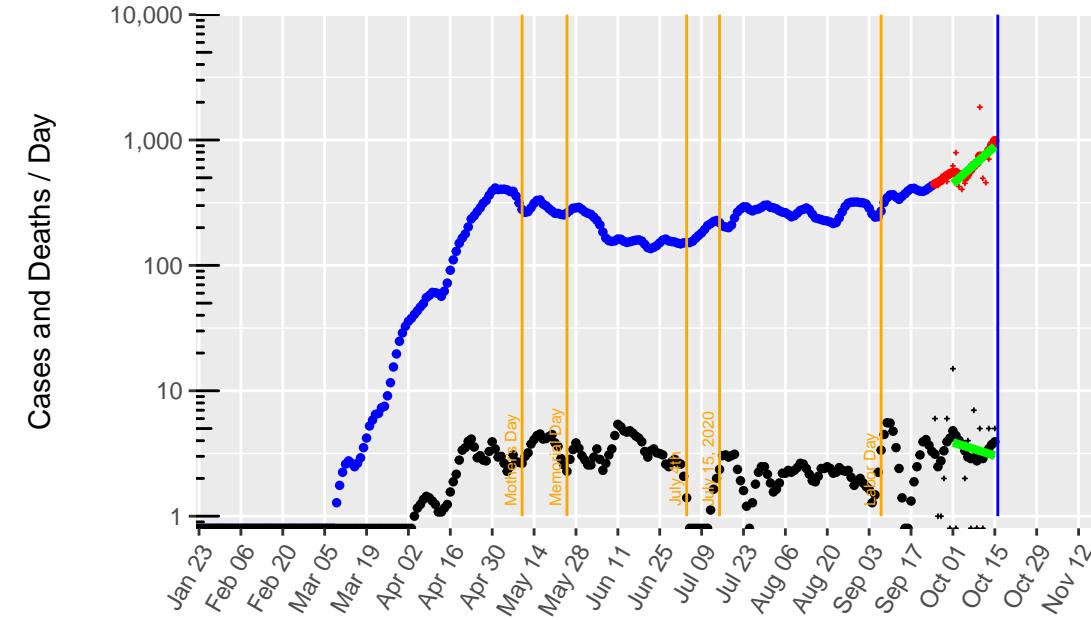
# Montana projection as of 2020-10-16



# Nebraska projection as of 2020-10-16

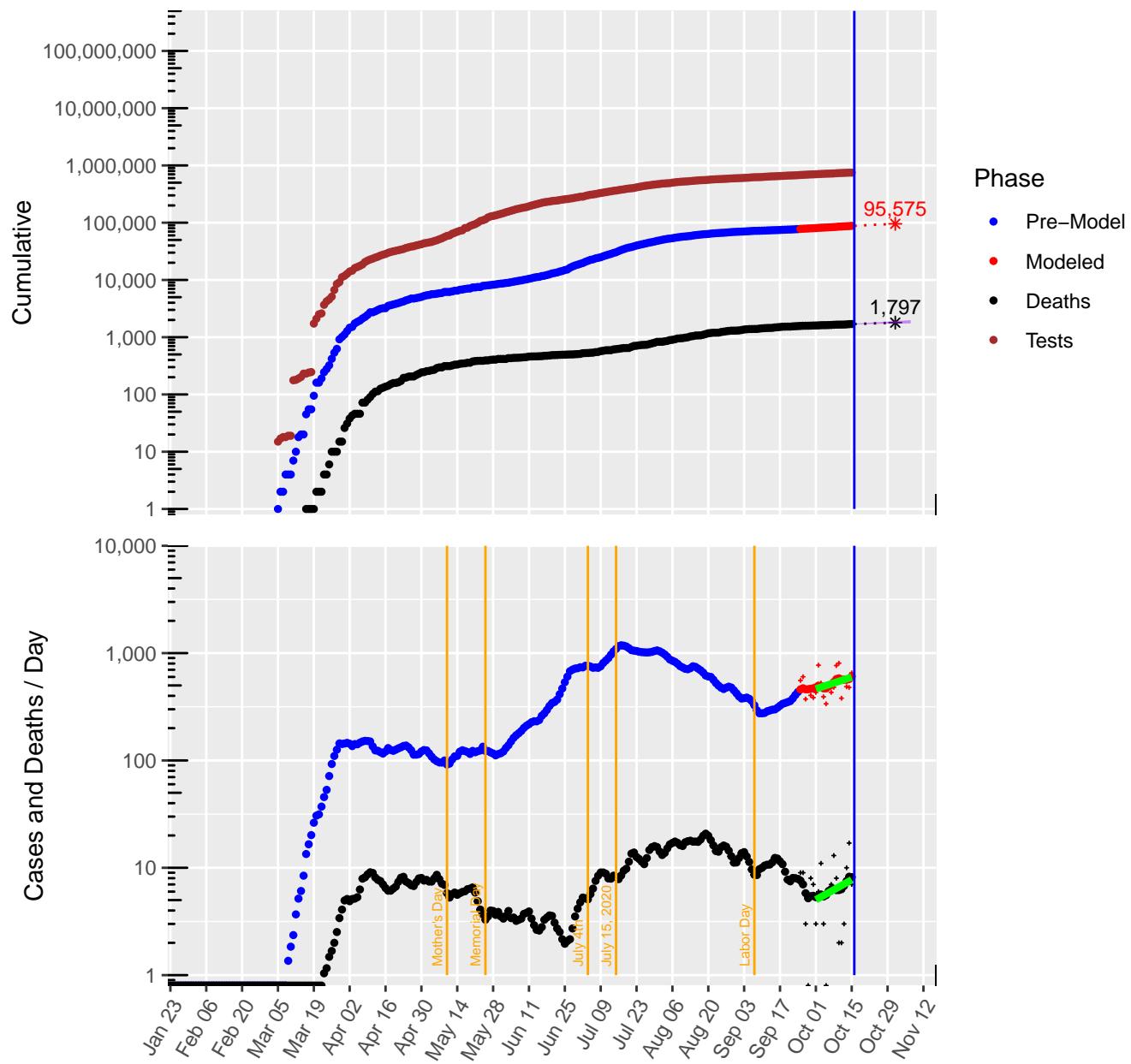


- Phase**
- Pre-Model
  - Modeled
  - Deaths
  - Tests

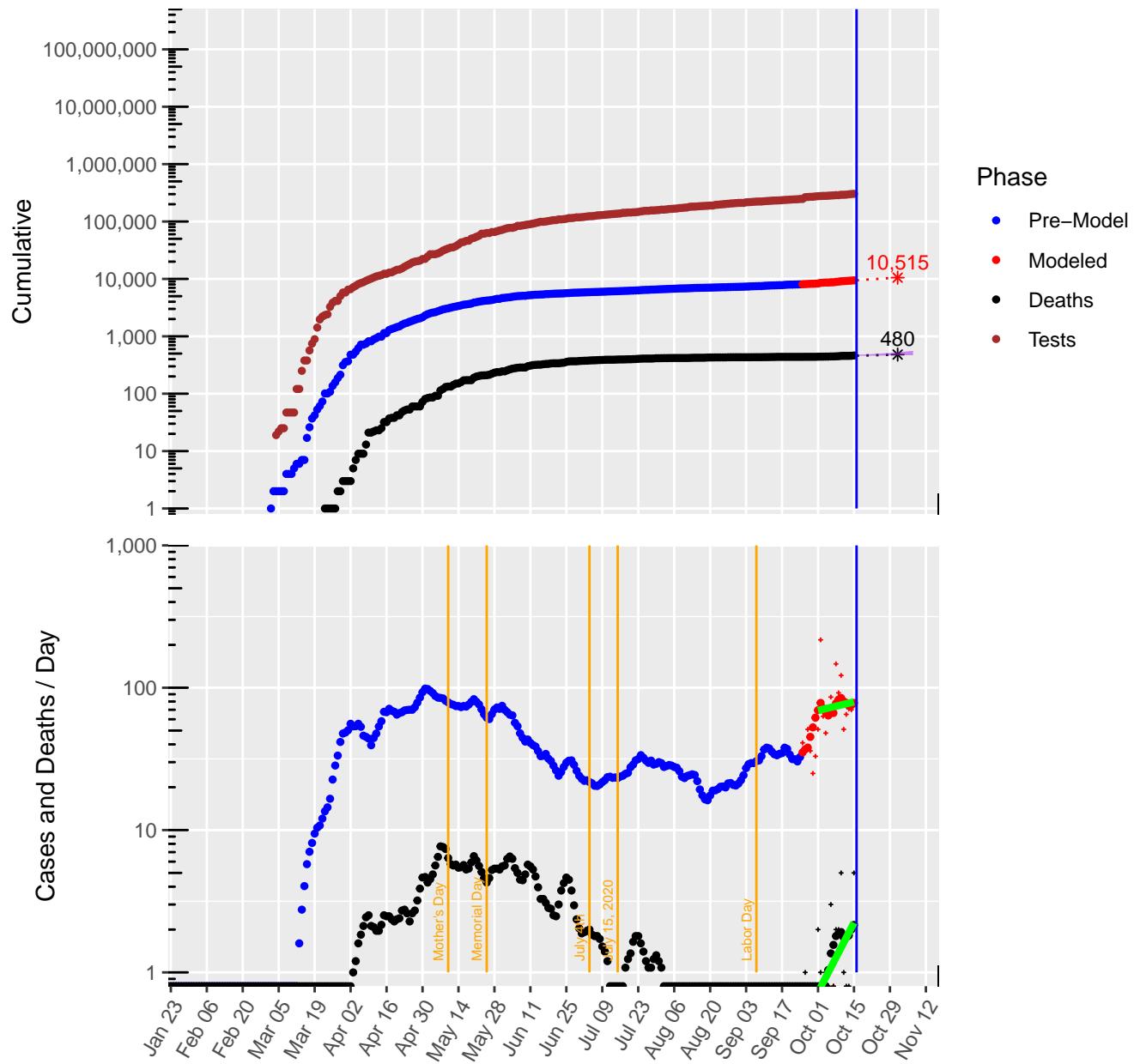


8 (961) --- Deaths: 535 (5) --- Case Mortality: 1.0% --- Daily Change: +4.7% Cases, -1.7% Deaths

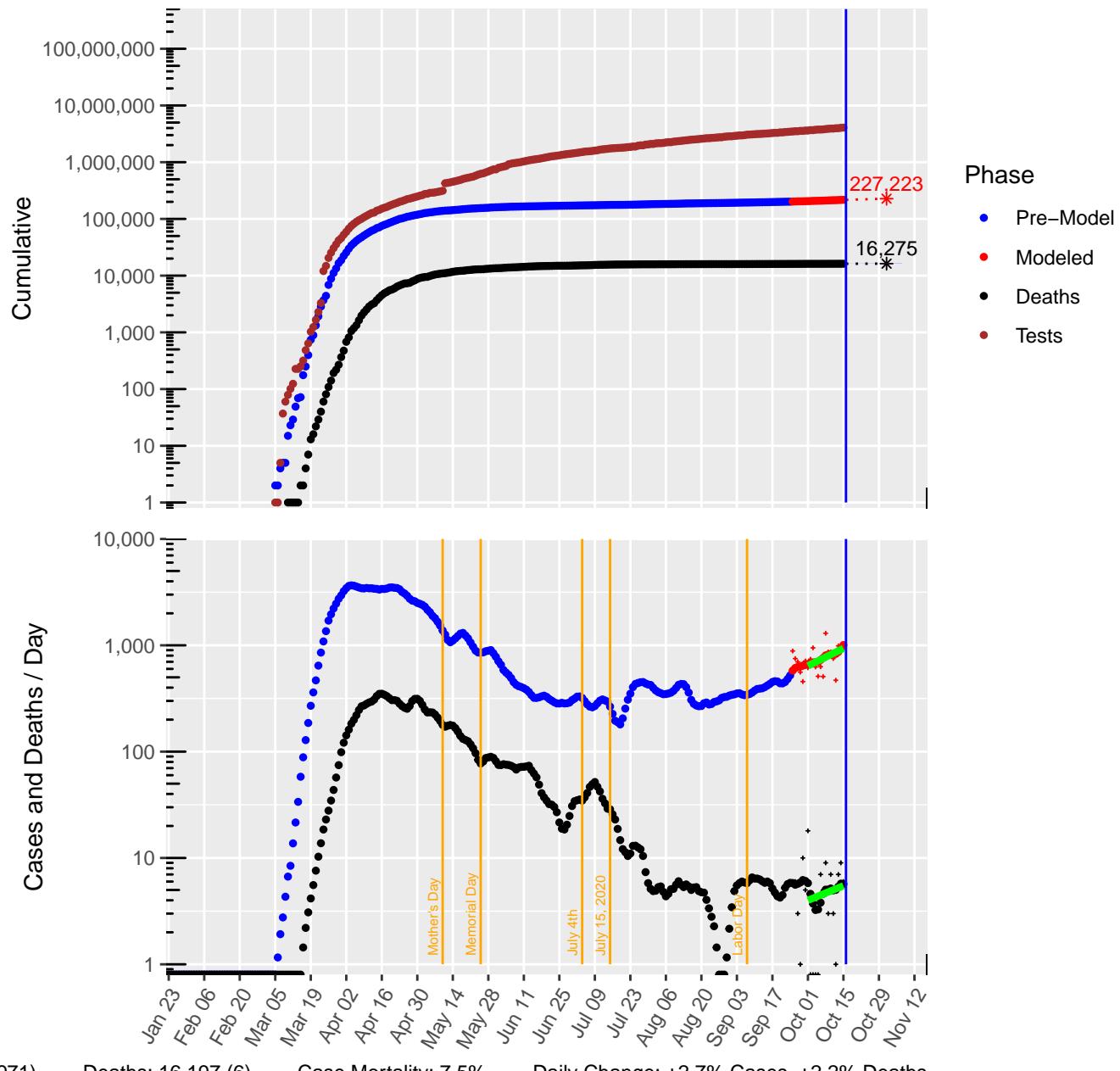
# Nevada projection as of 2020-10-16



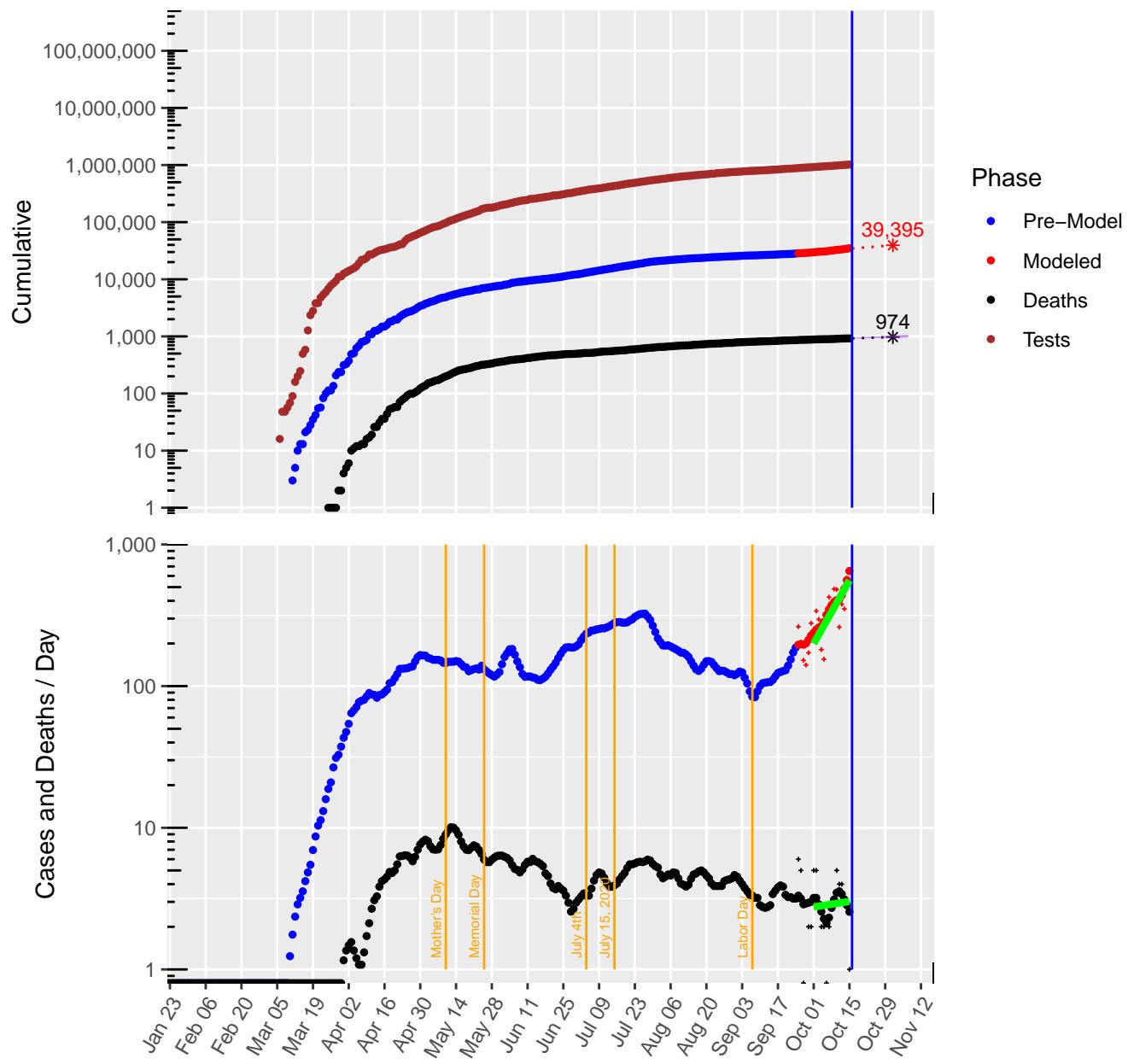
# New Hampshire projection as of 2020-10-16



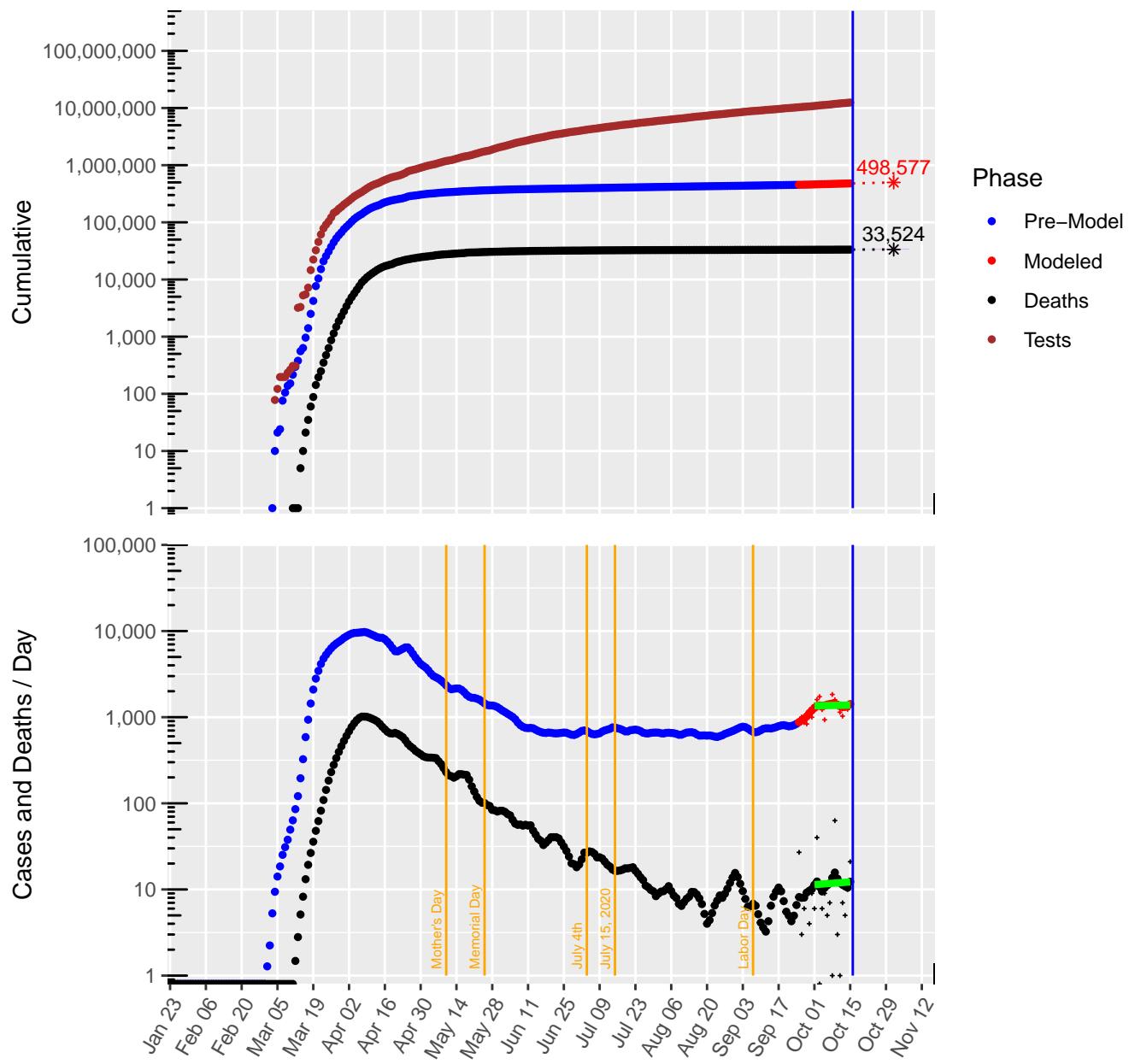
# New Jersey projection as of 2020-10-16



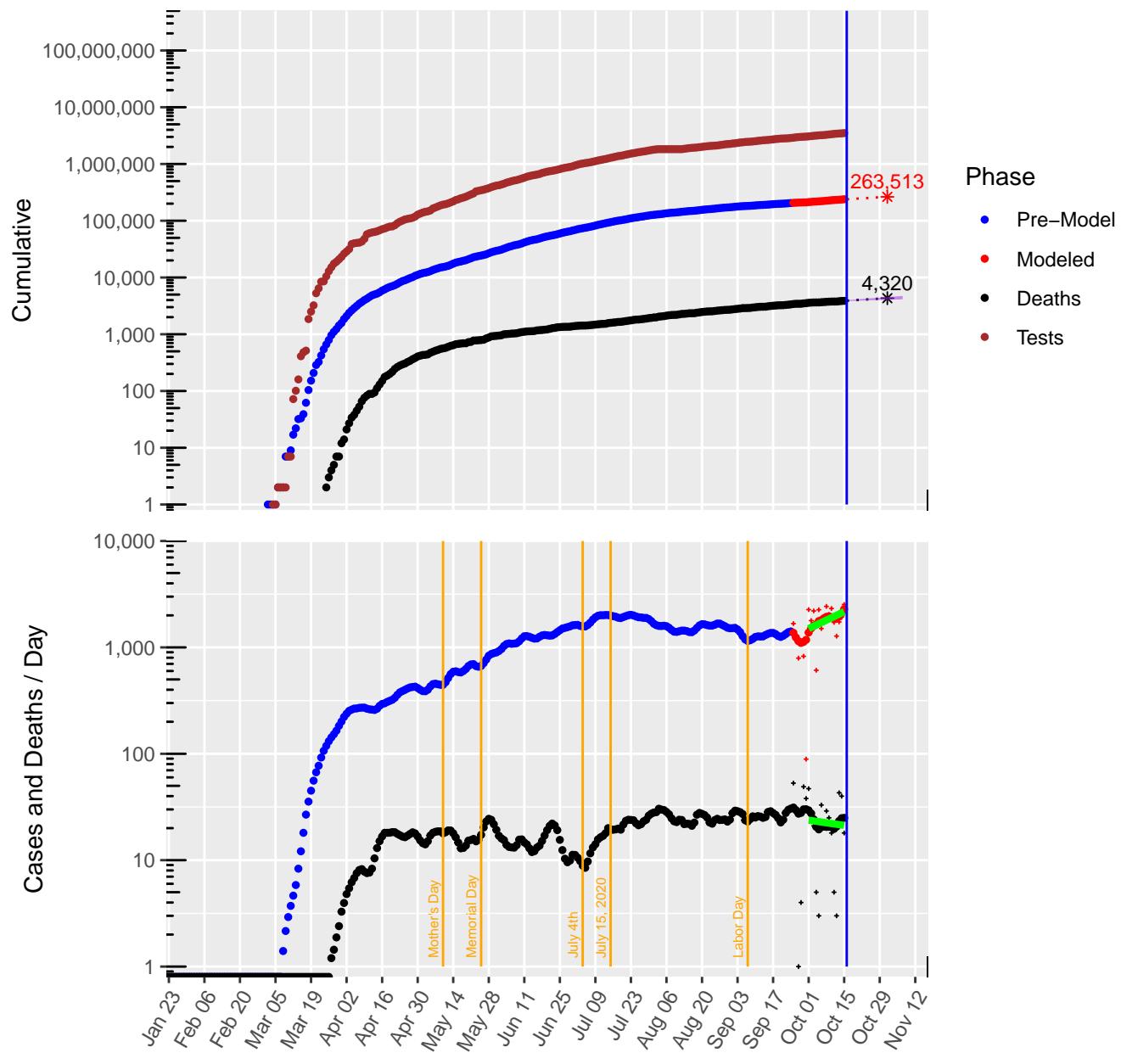
# New Mexico projection as of 2020-10-16



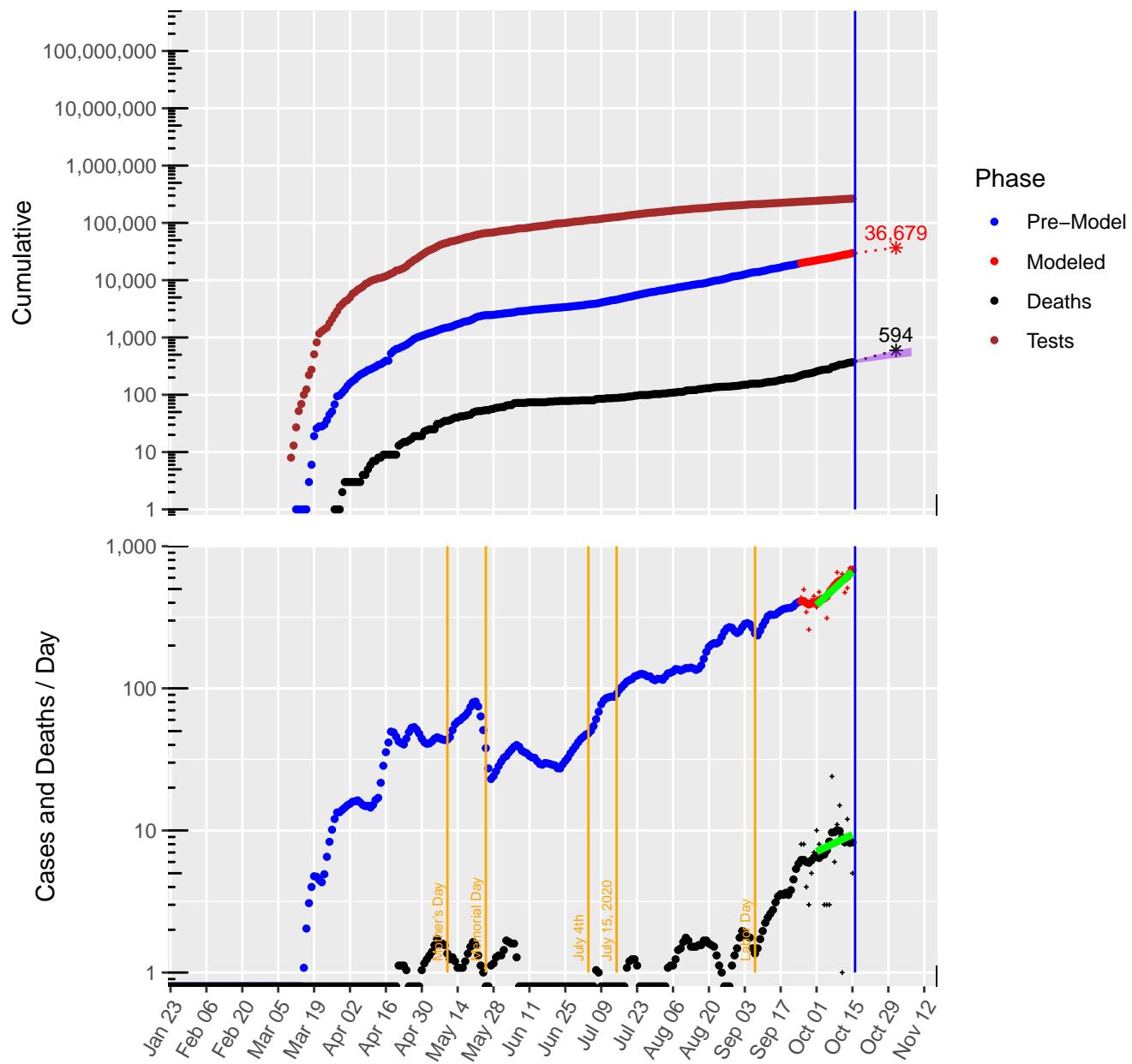
# New York projection as of 2020-10-16



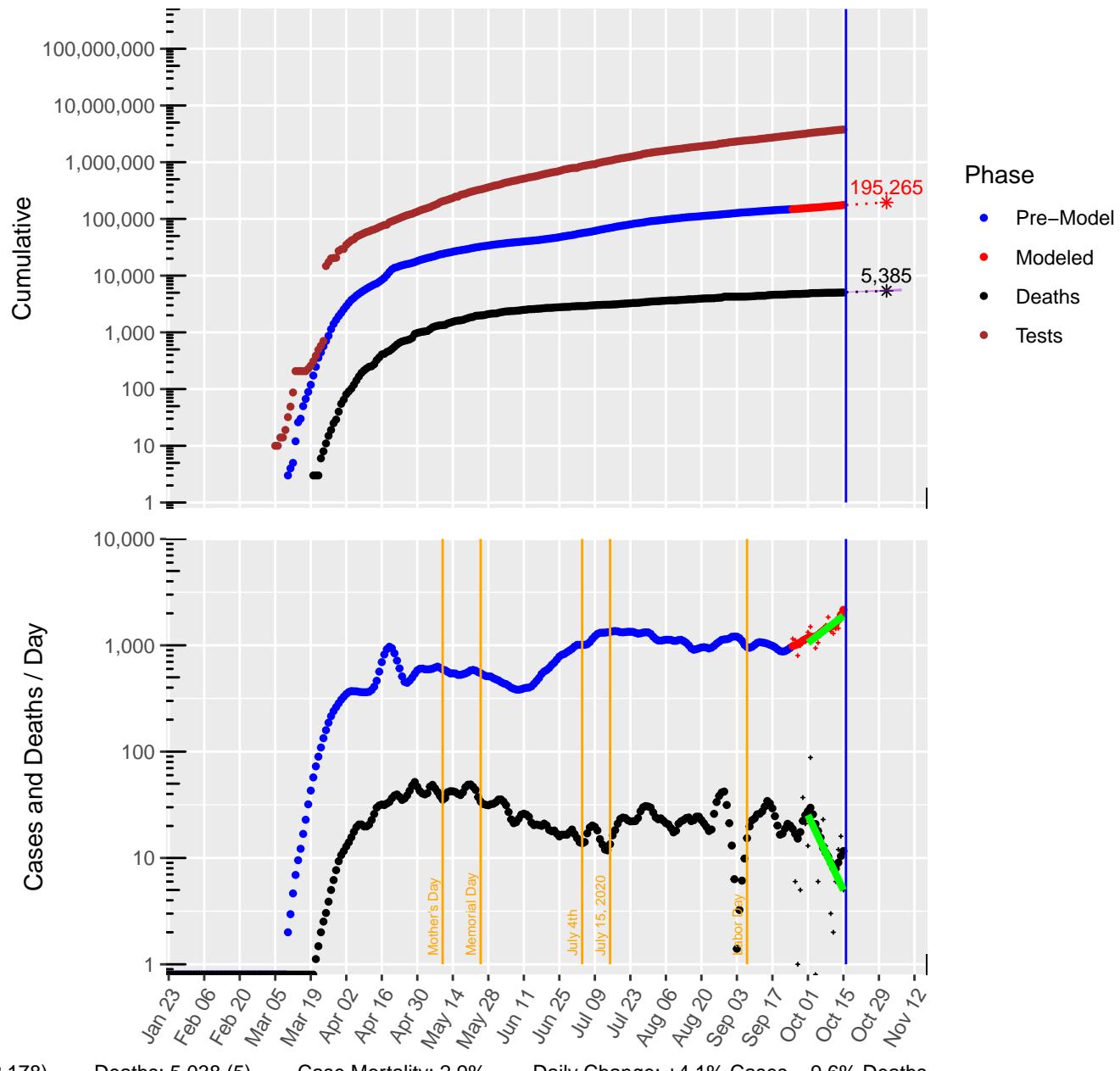
# North Carolina projection as of 2020-10-16



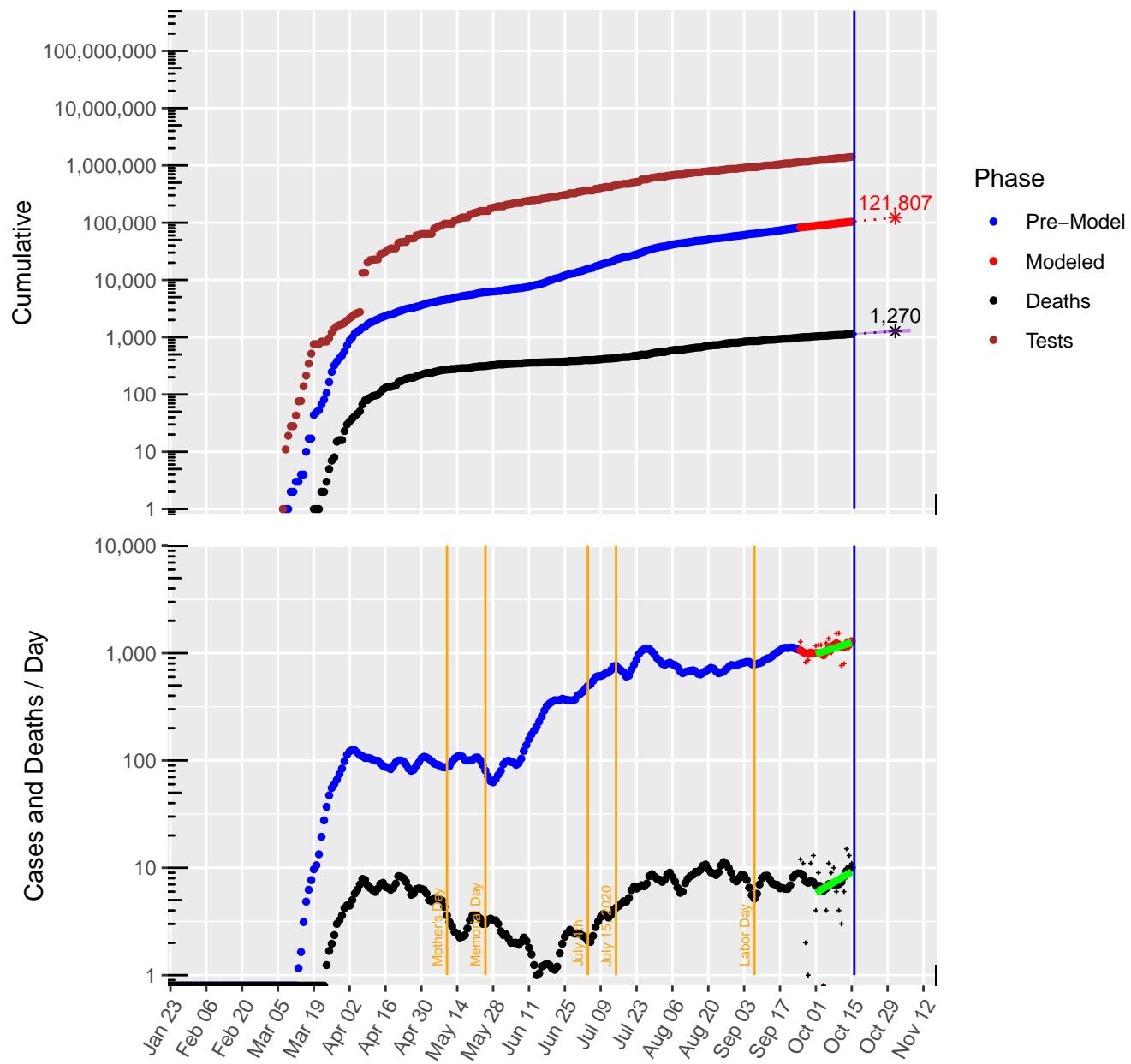
# North Dakota projection as of 2020-10-16



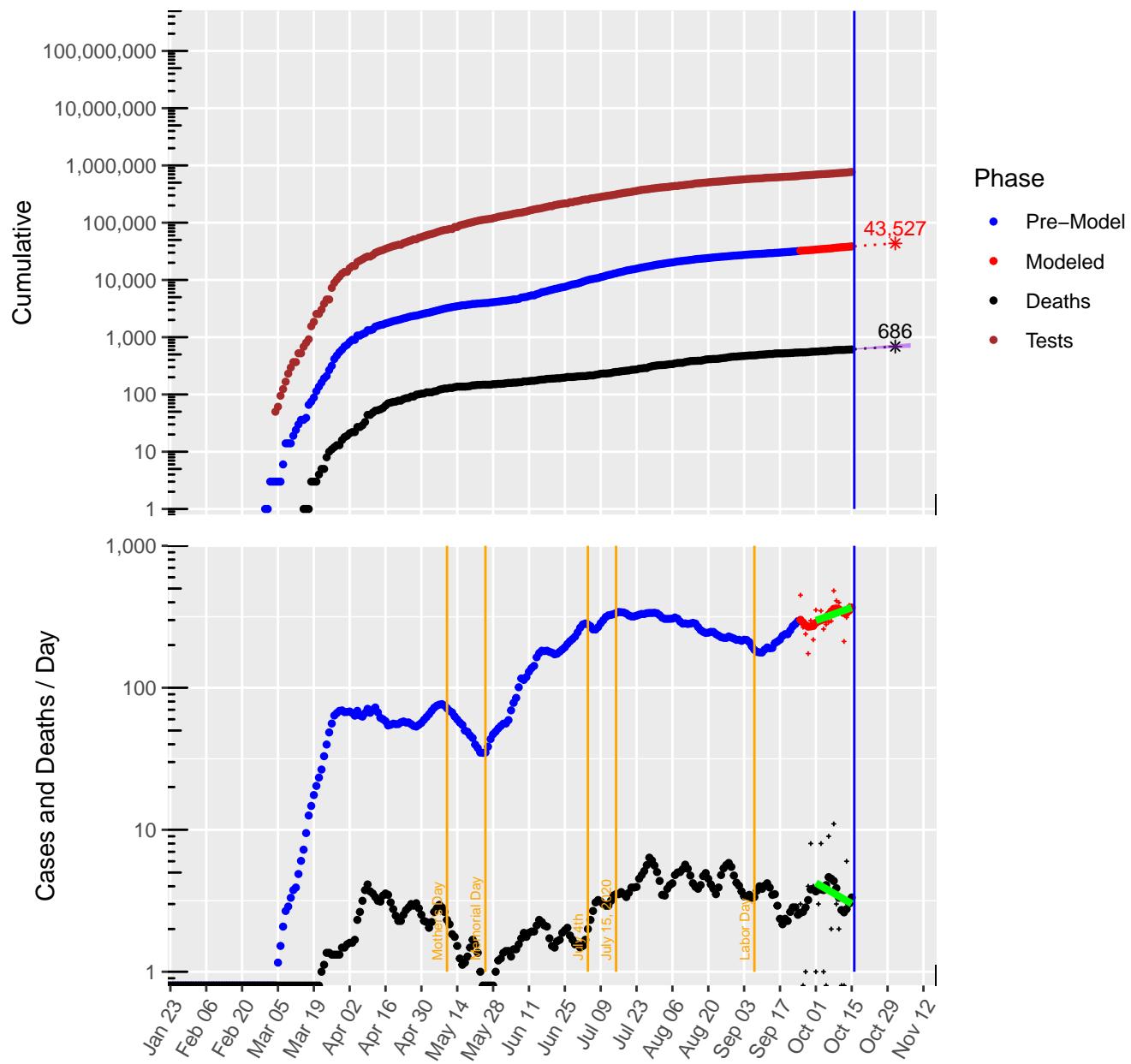
# Ohio projection as of 2020-10-16



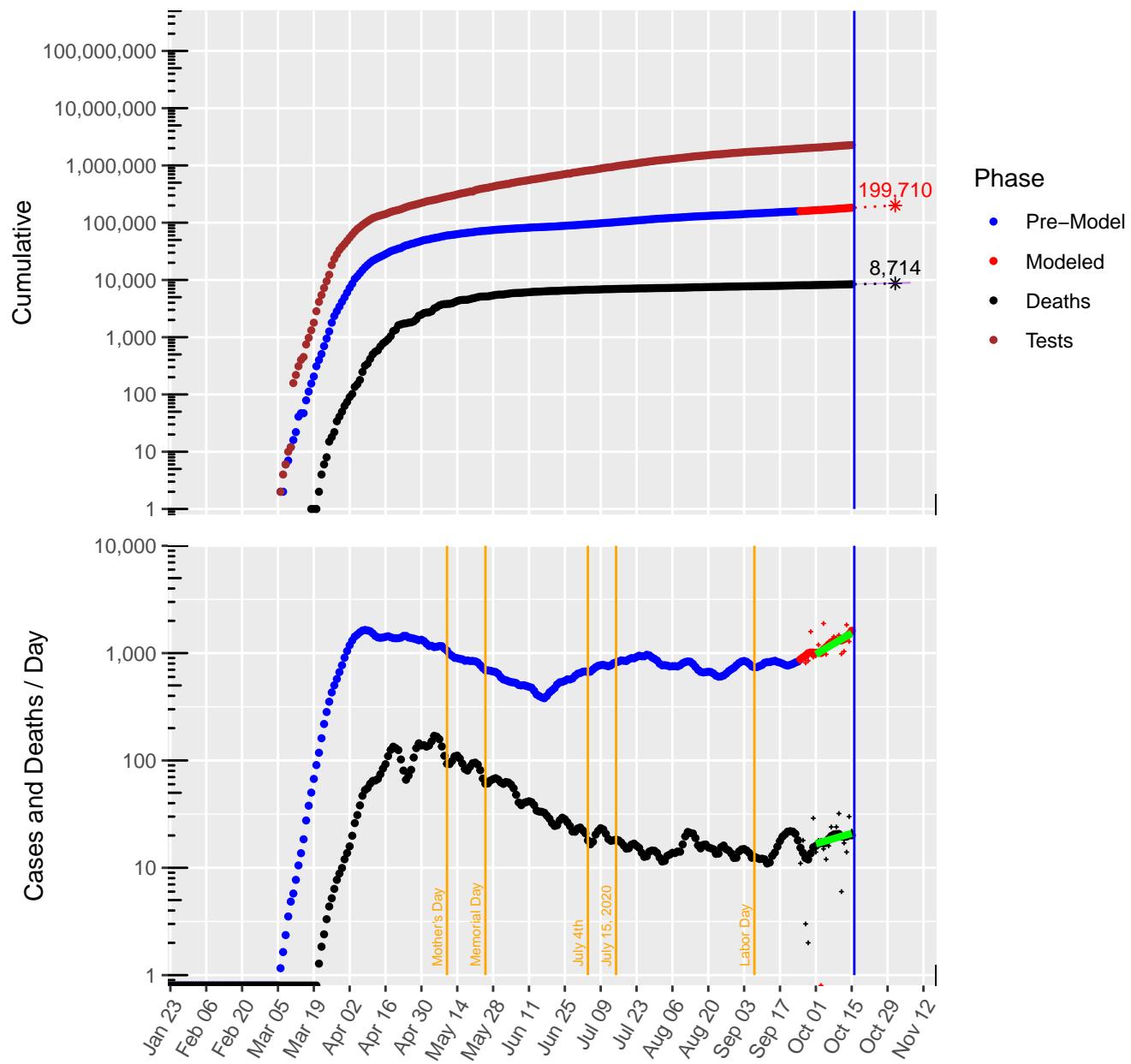
# Oklahoma projection as of 2020-10-16



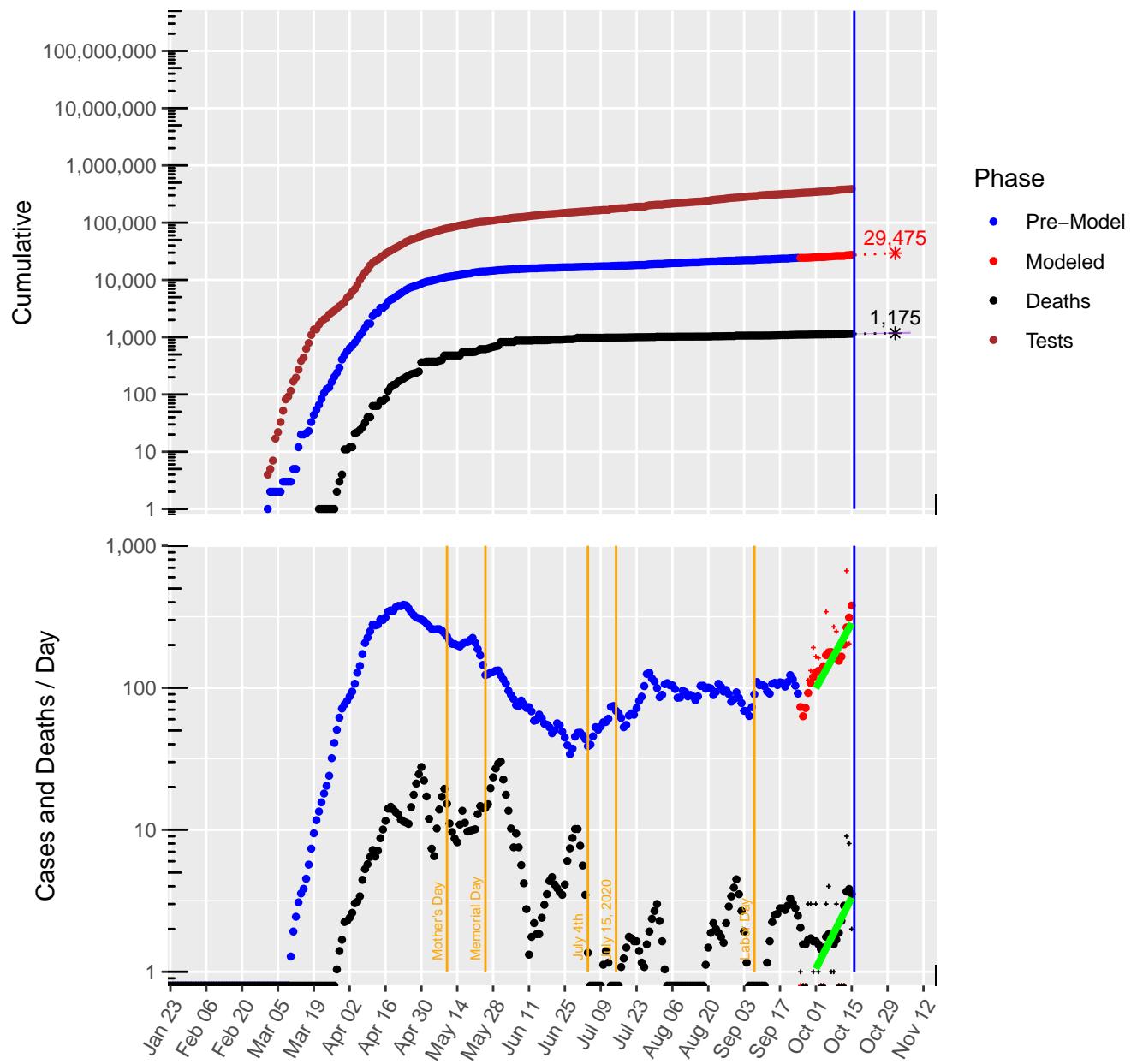
# Oregon projection as of 2020-10-16



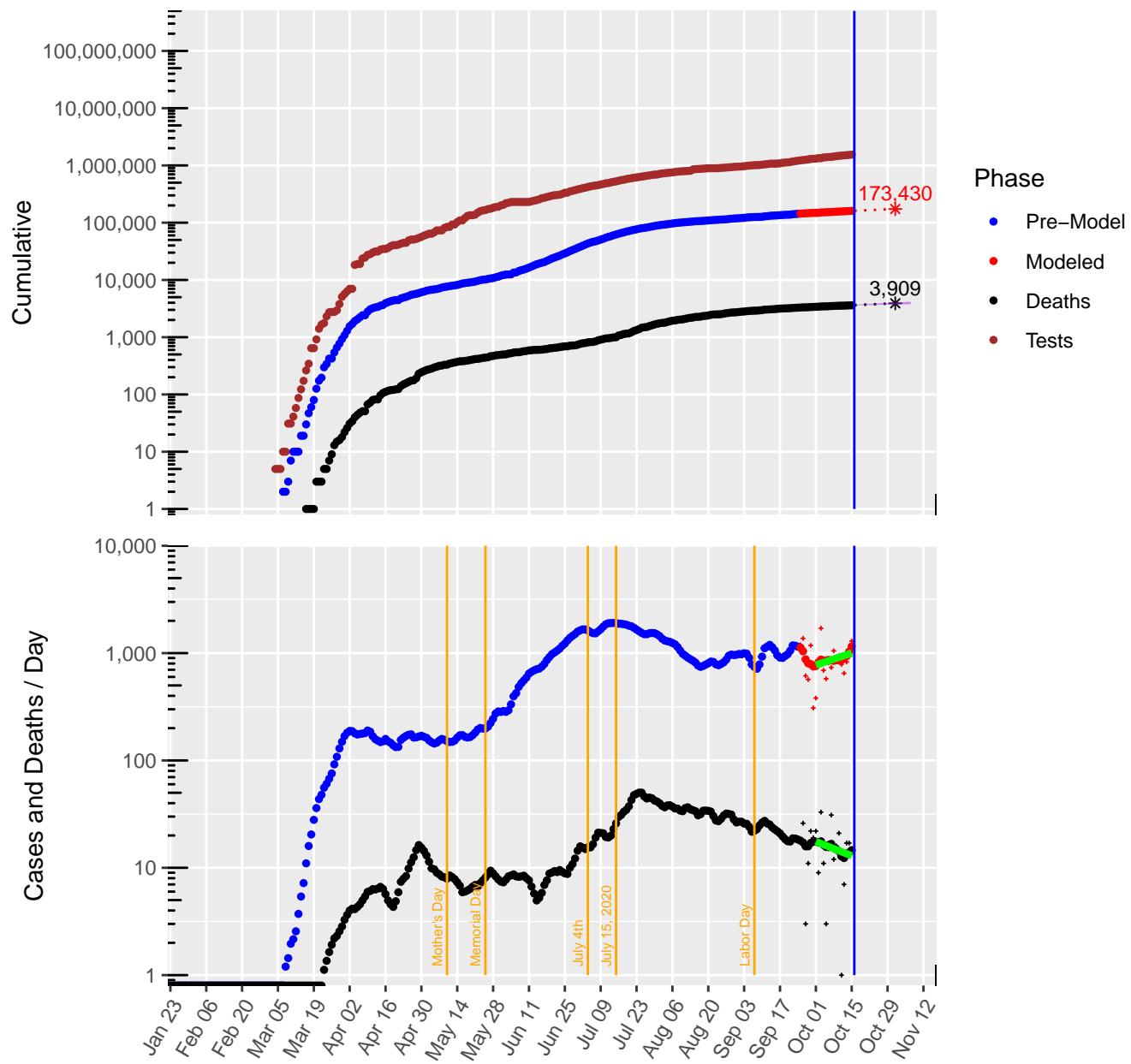
# Pennsylvania projection as of 2020-10-16



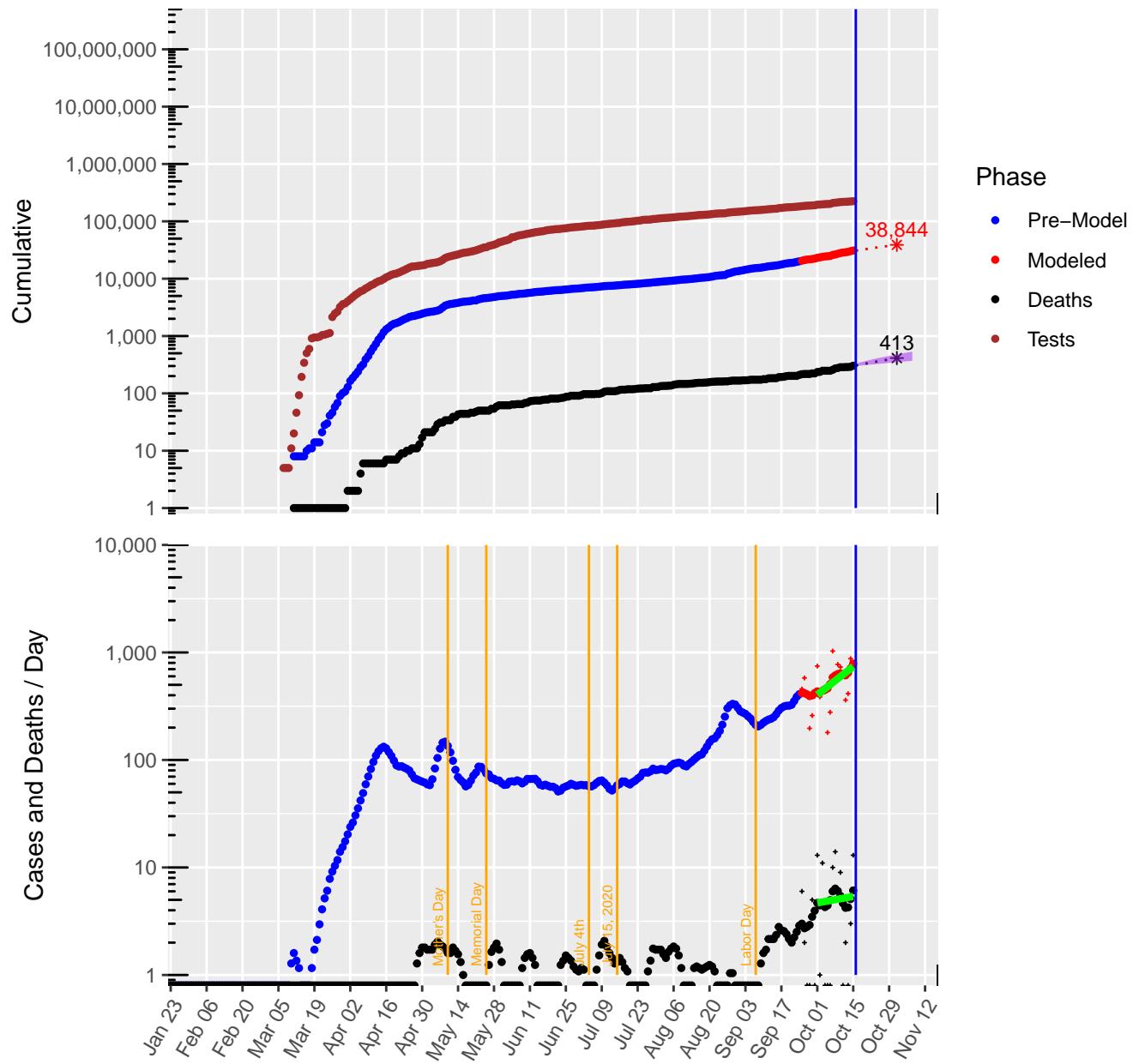
# Rhode Island projection as of 2020-10-16



# South Carolina projection as of 2020-10-16

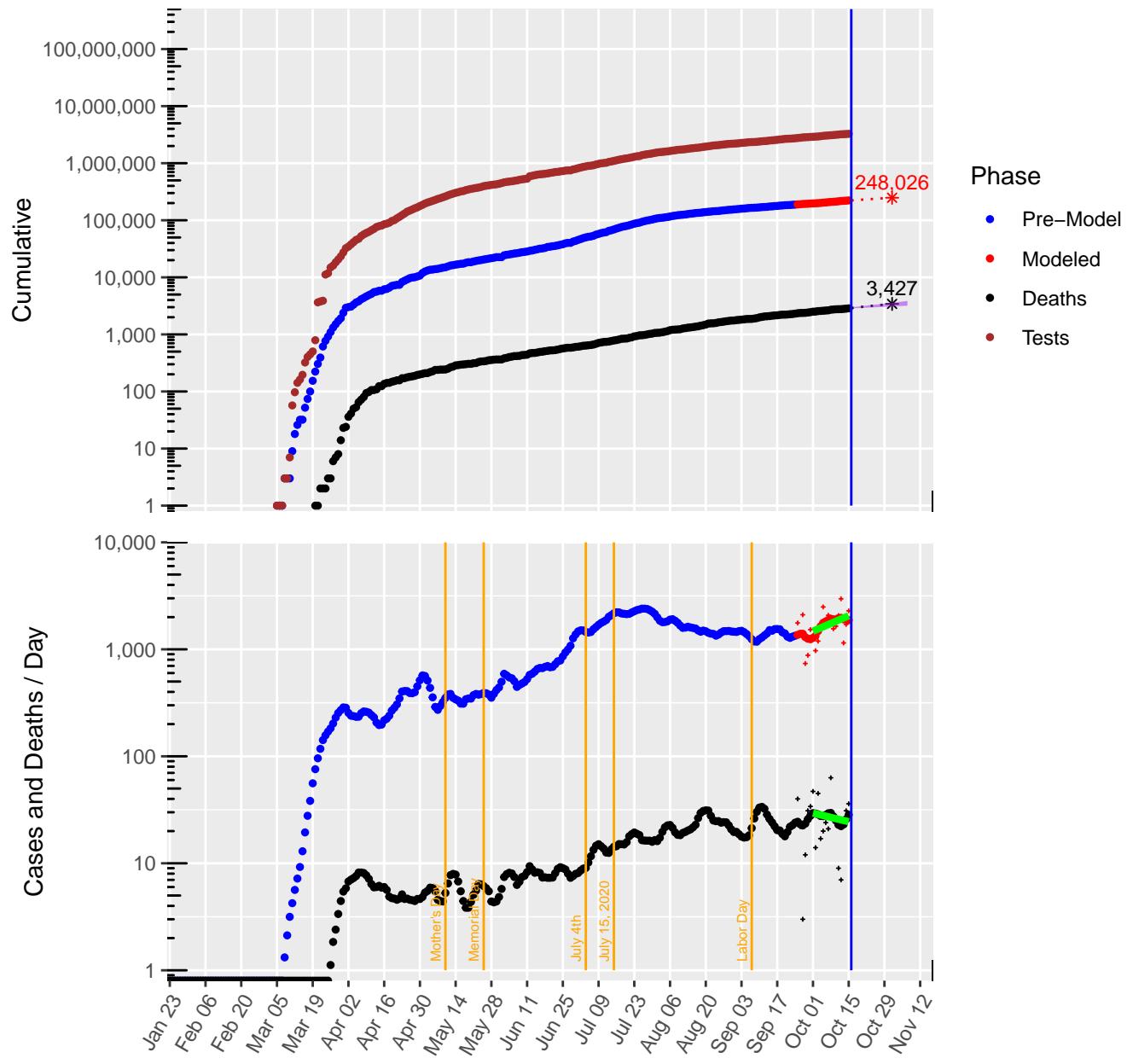


# South Dakota projection as of 2020-10-16

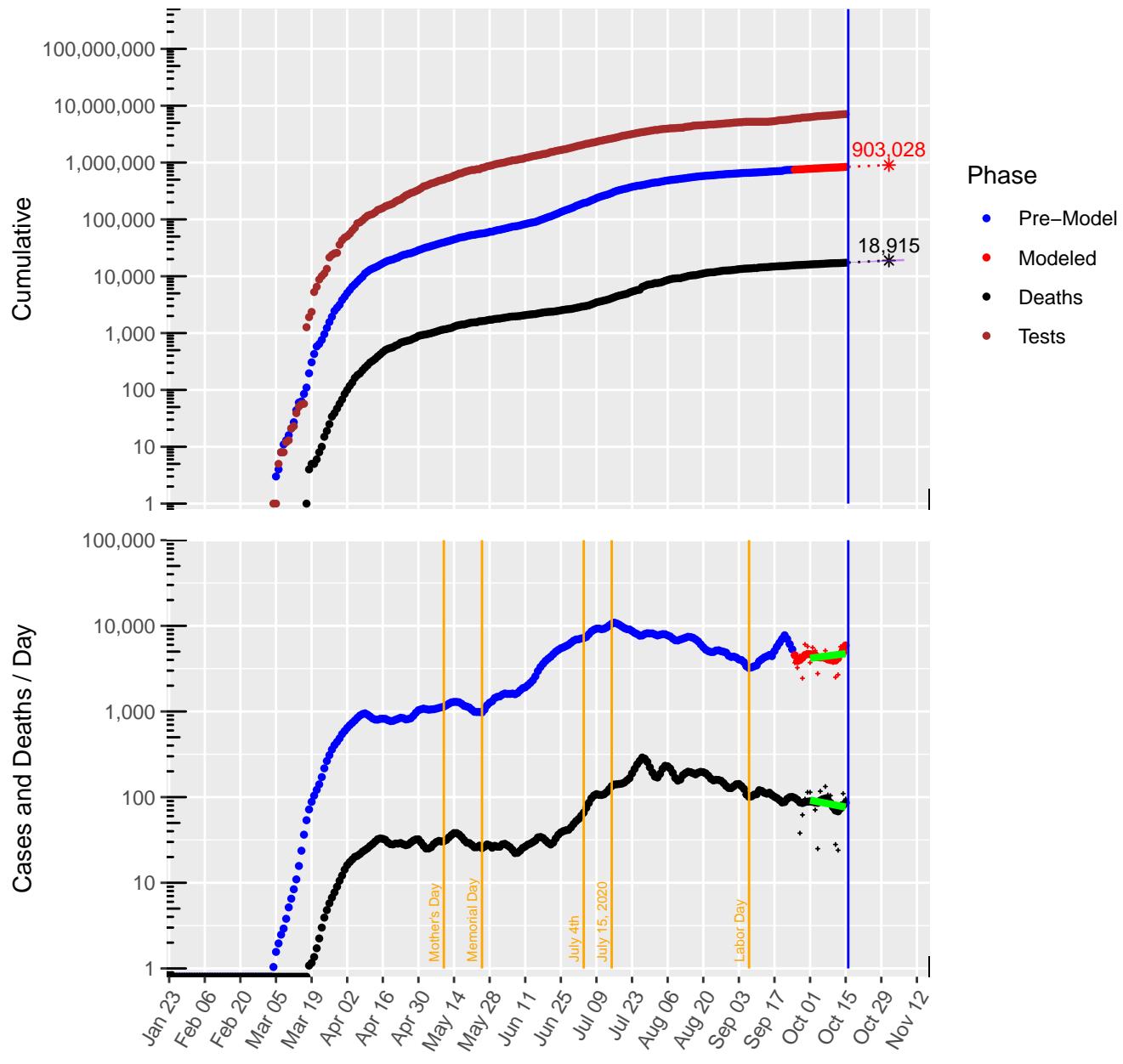


(797) -- Deaths: 304 (13) -- Case Mortality: 1.0% -- Daily Change: +4.2% Cases, +1.0% Deaths

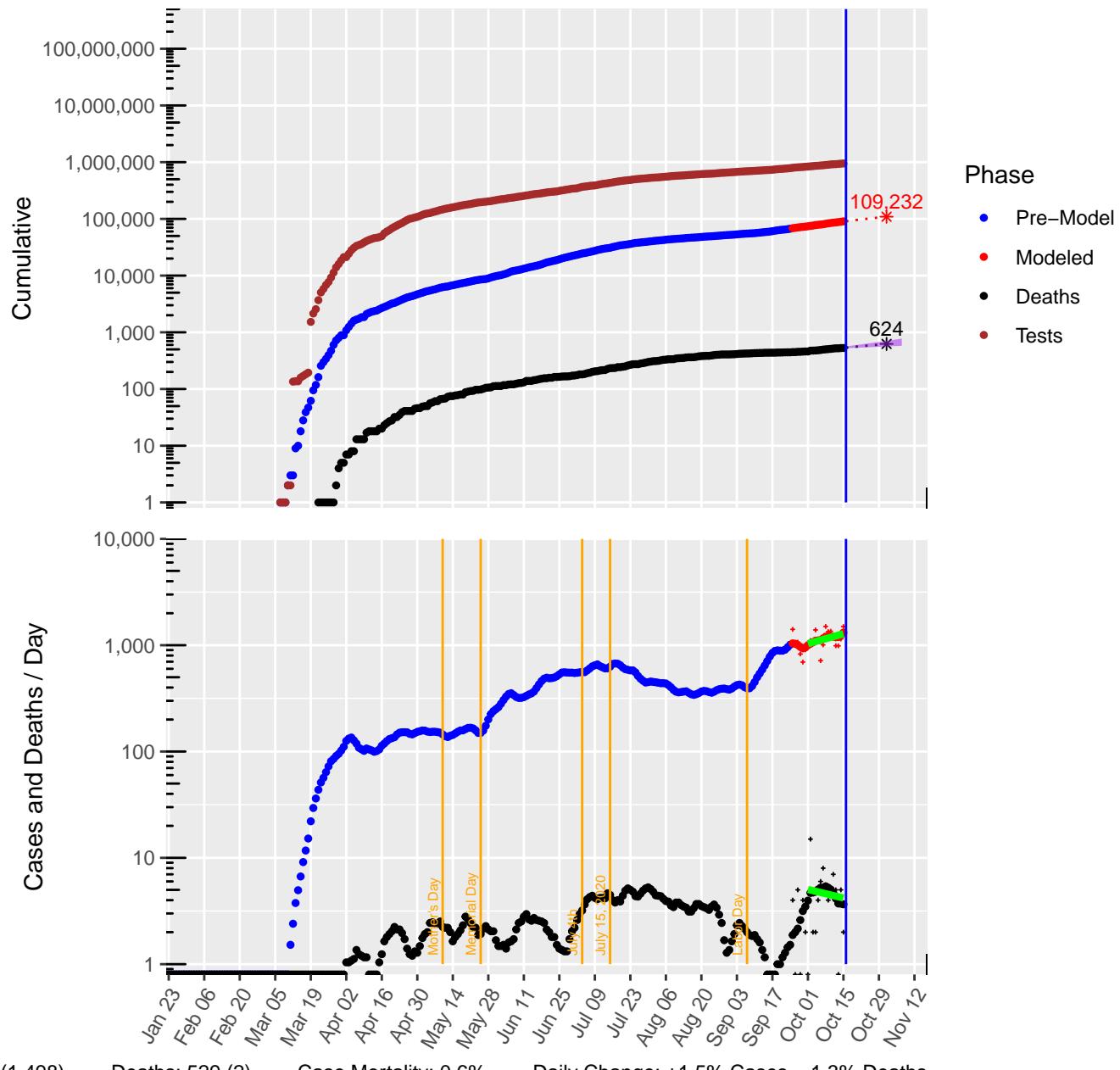
# Tennessee projection as of 2020-10-16



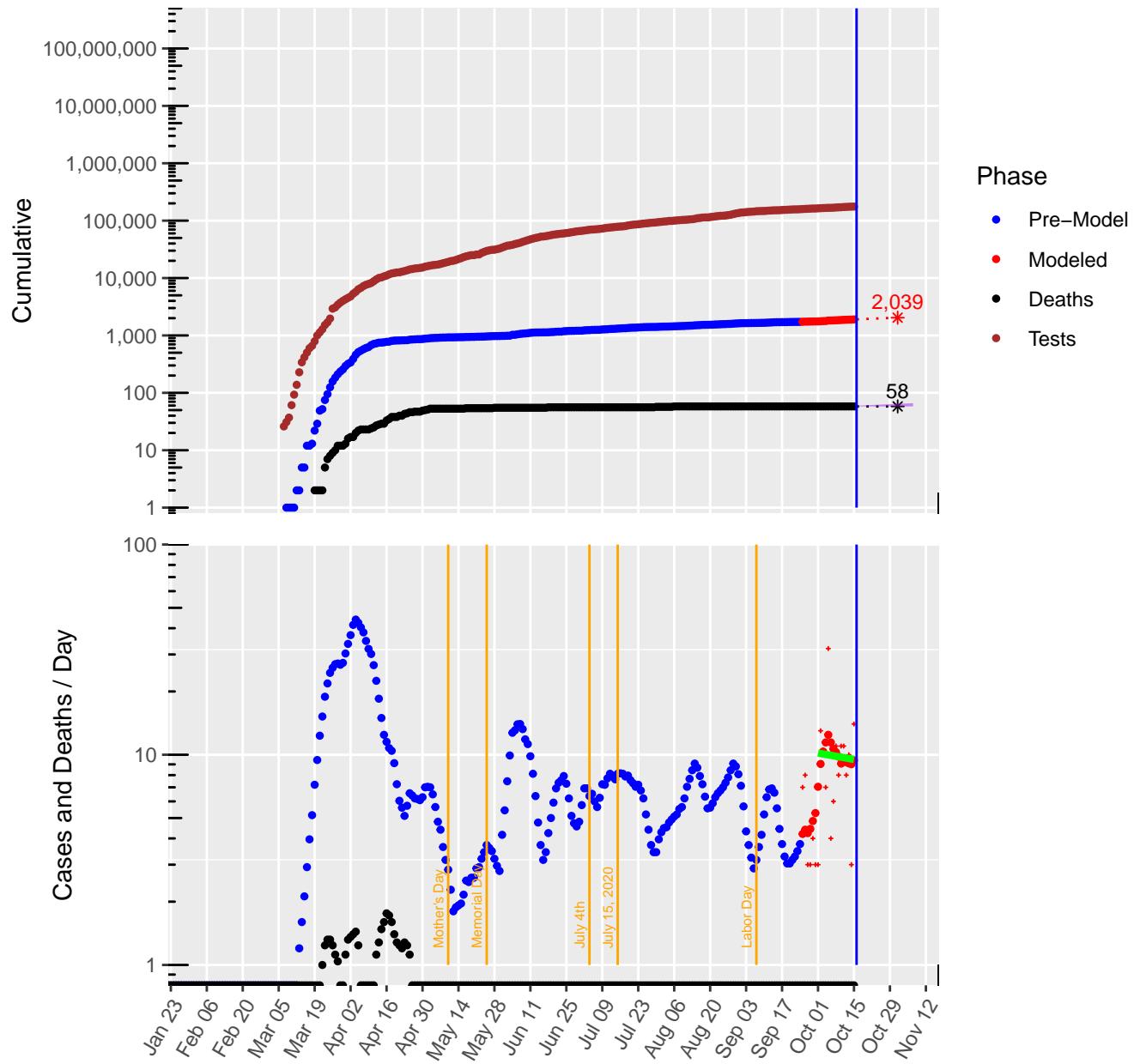
# Texas projection as of 2020-10-16



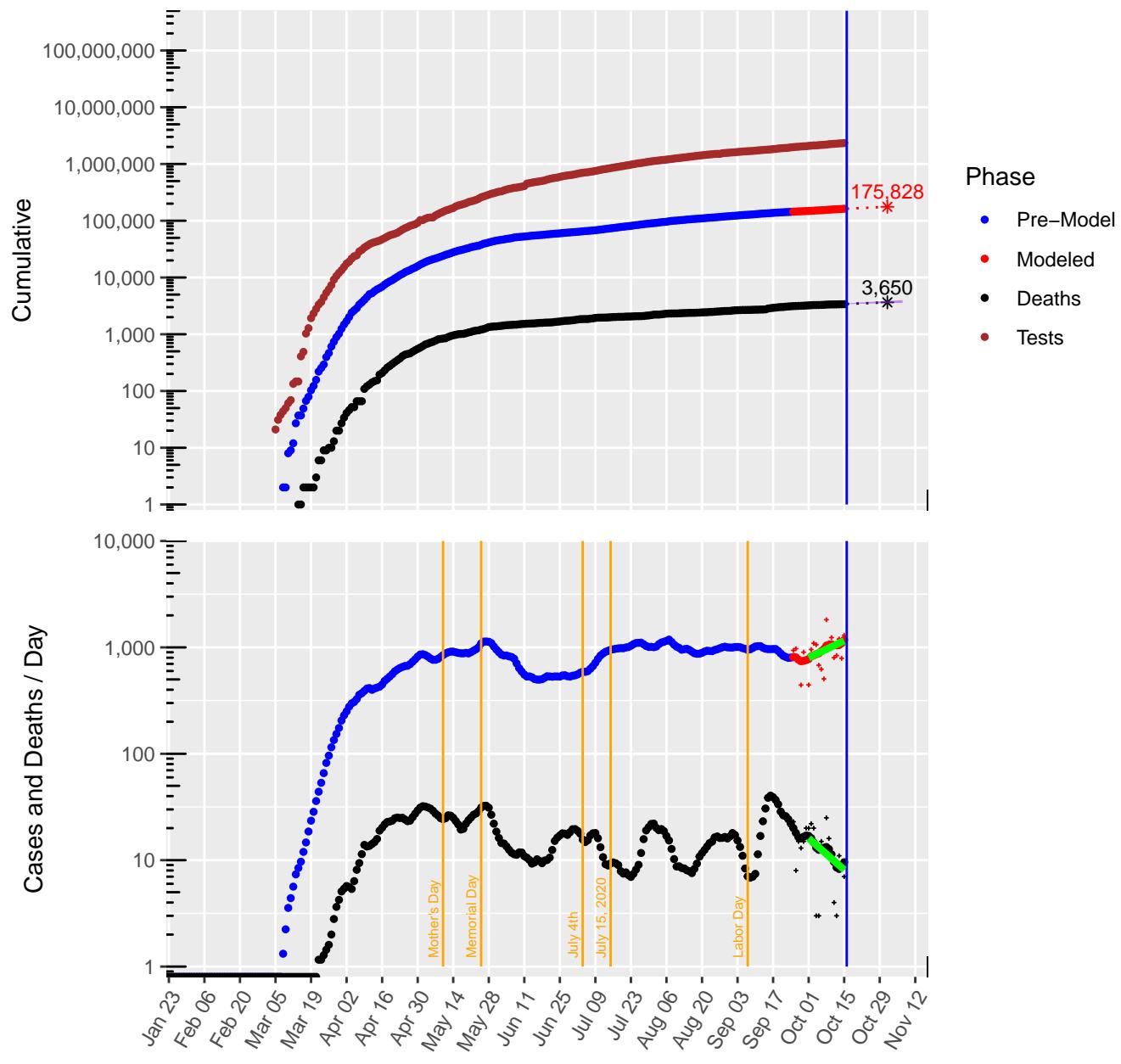
# Utah projection as of 2020-10-16



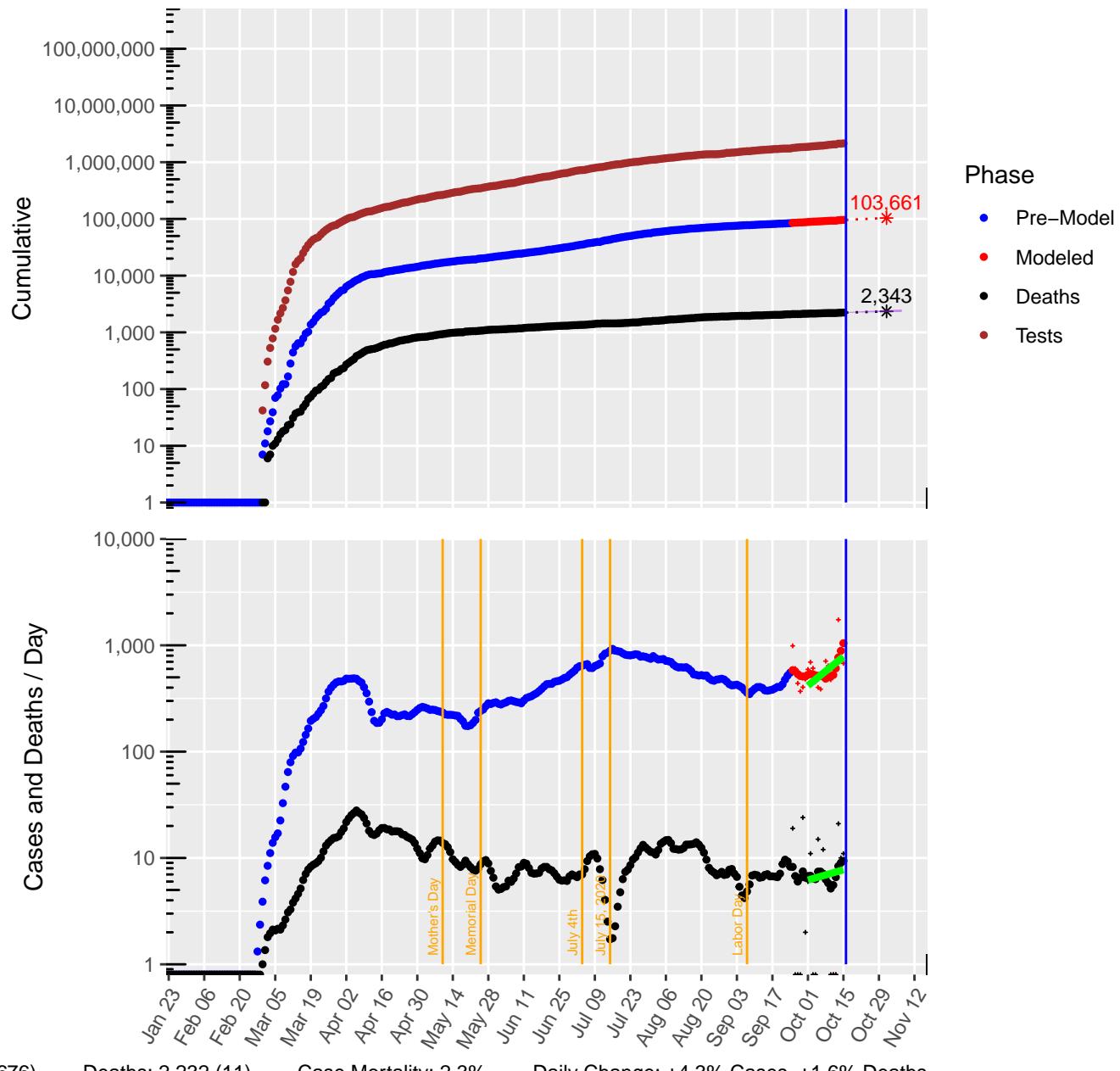
# Vermont projection as of 2020-10-16



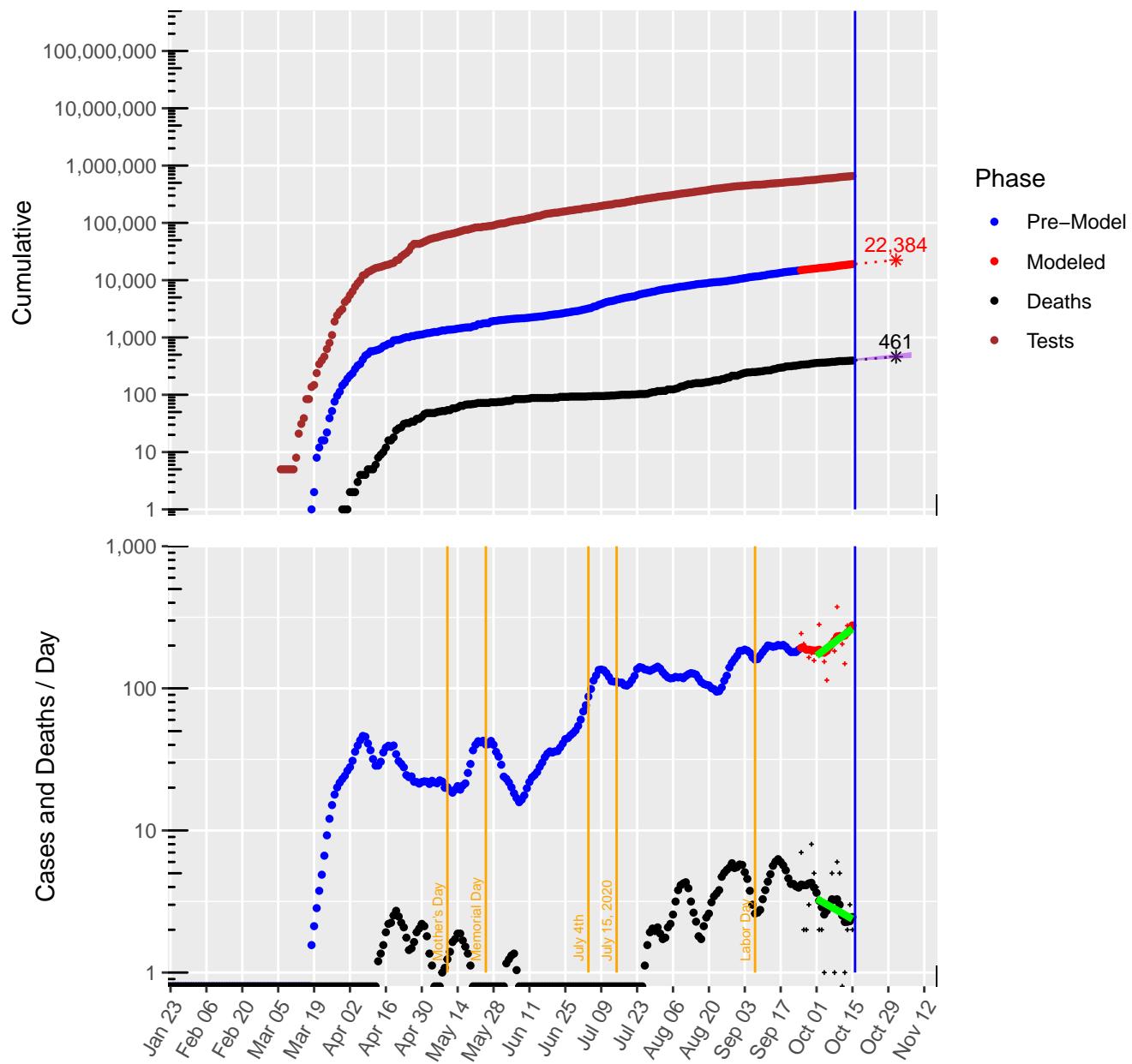
# Virginia projection as of 2020-10-16



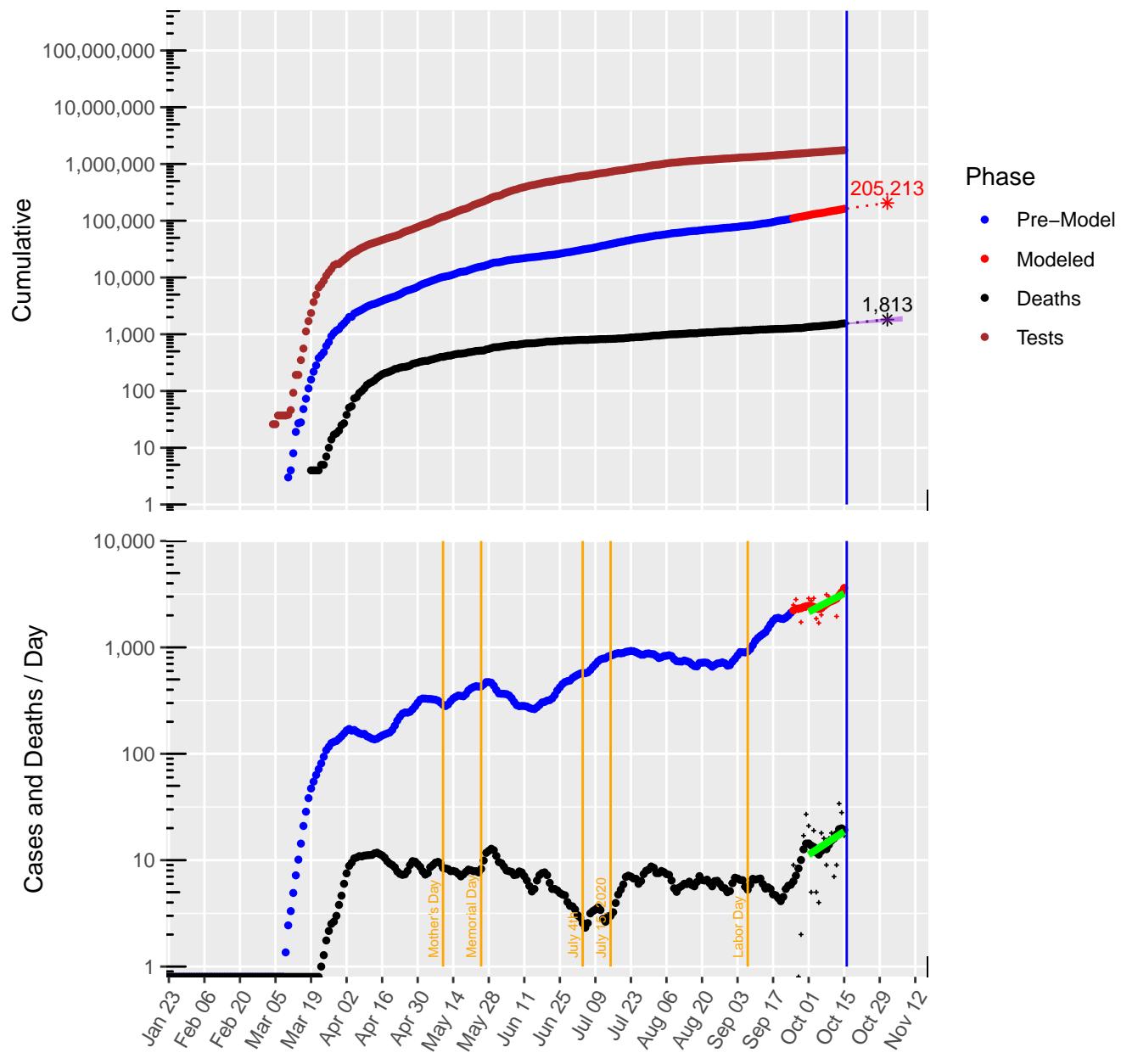
# Washington projection as of 2020-10-16



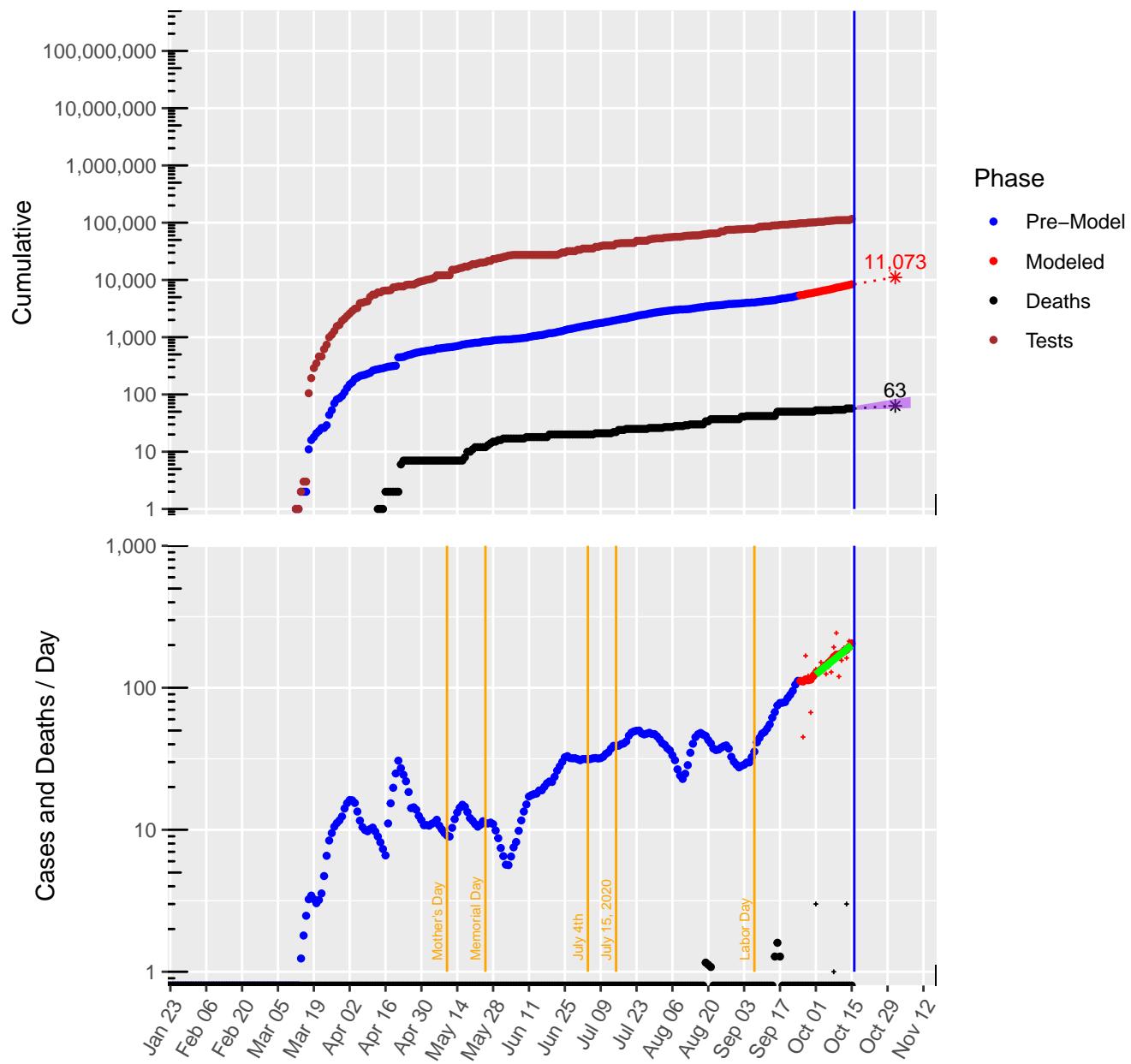
# West Virginia projection as of 2020-10-16



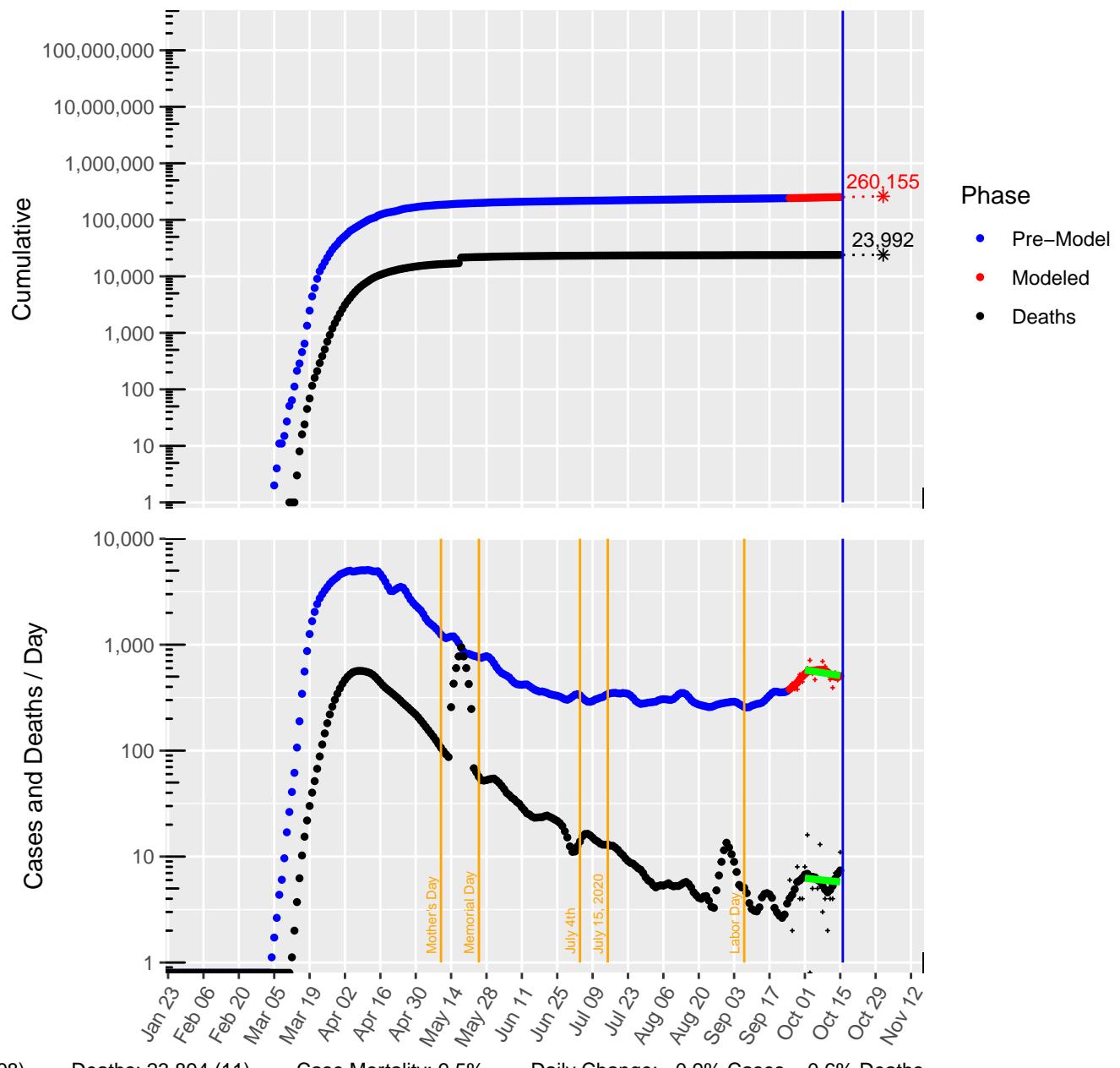
# Wisconsin projection as of 2020-10-16



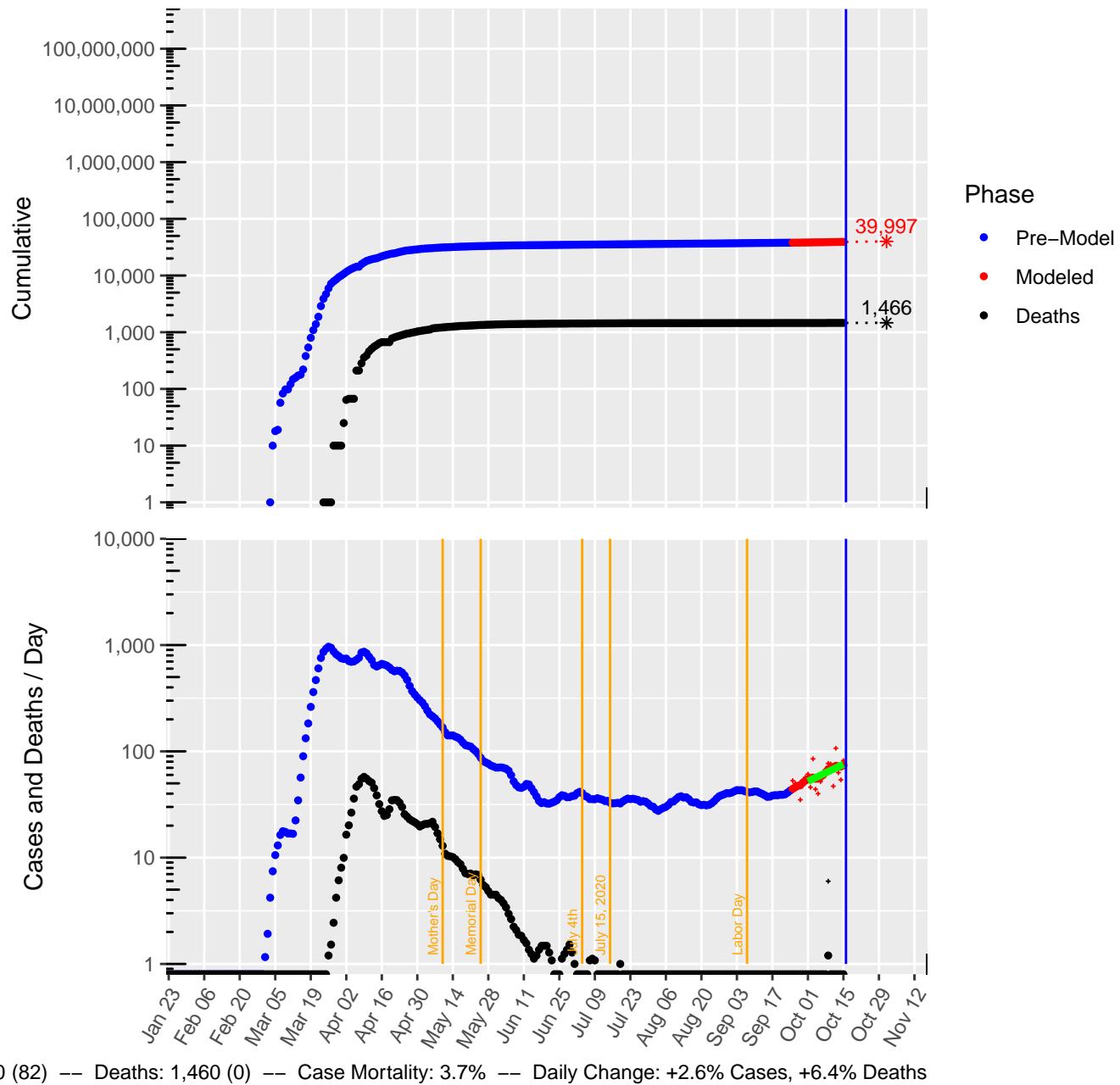
# Wyoming projection as of 2020-10-16



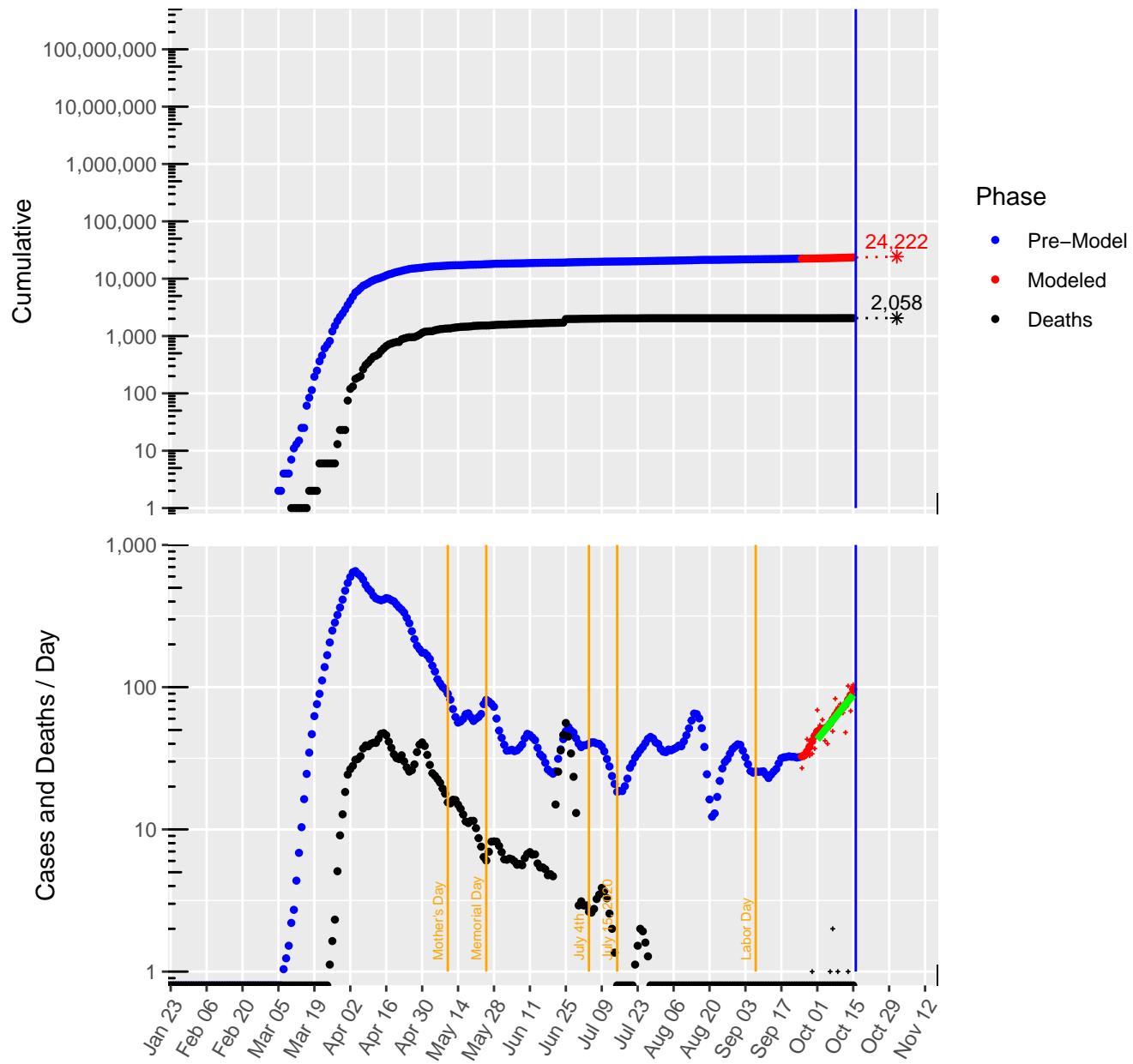
# New York City projection as of 2020-10-16



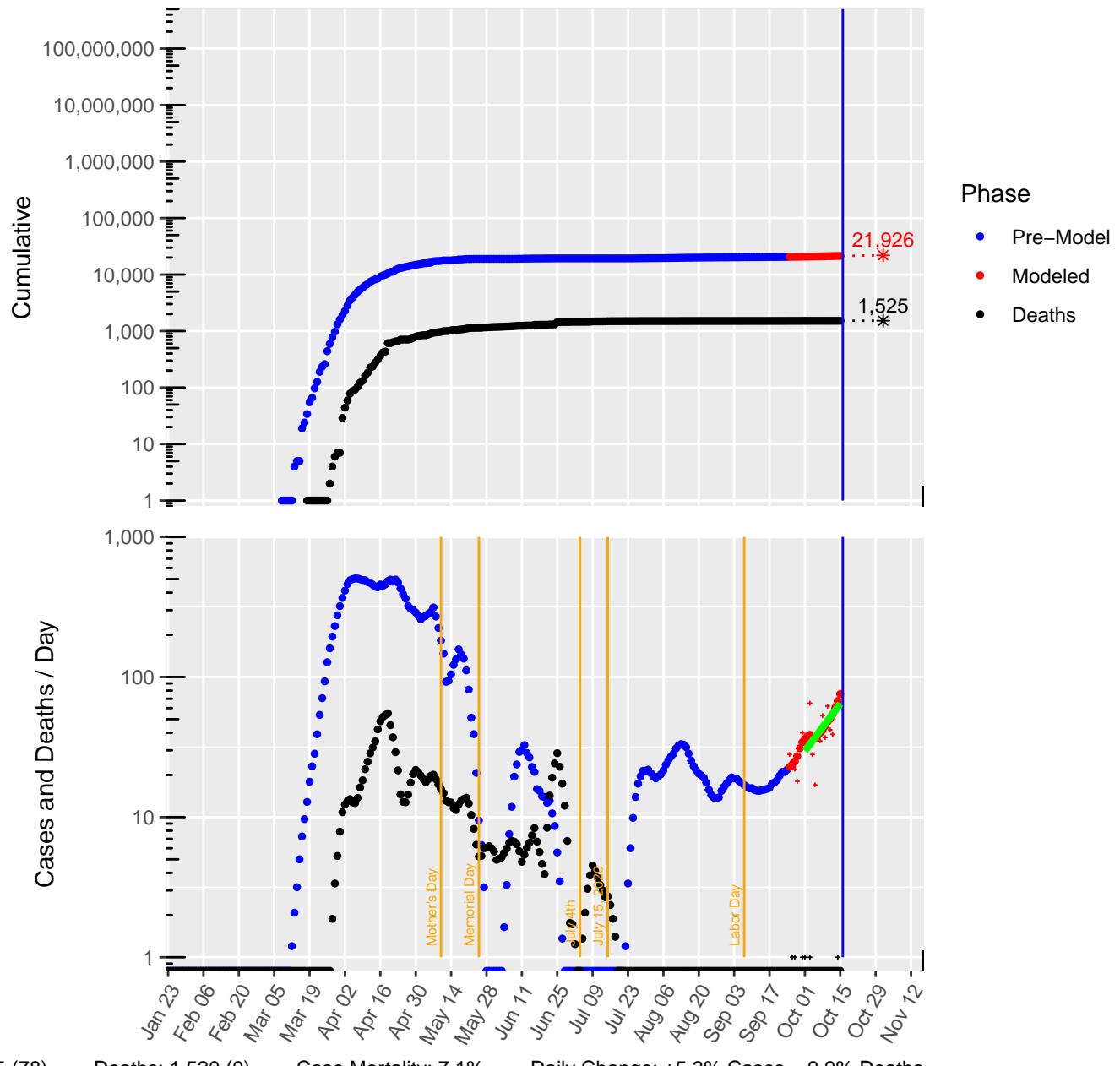
# Westchester County, NY projection as of 2020-10-16



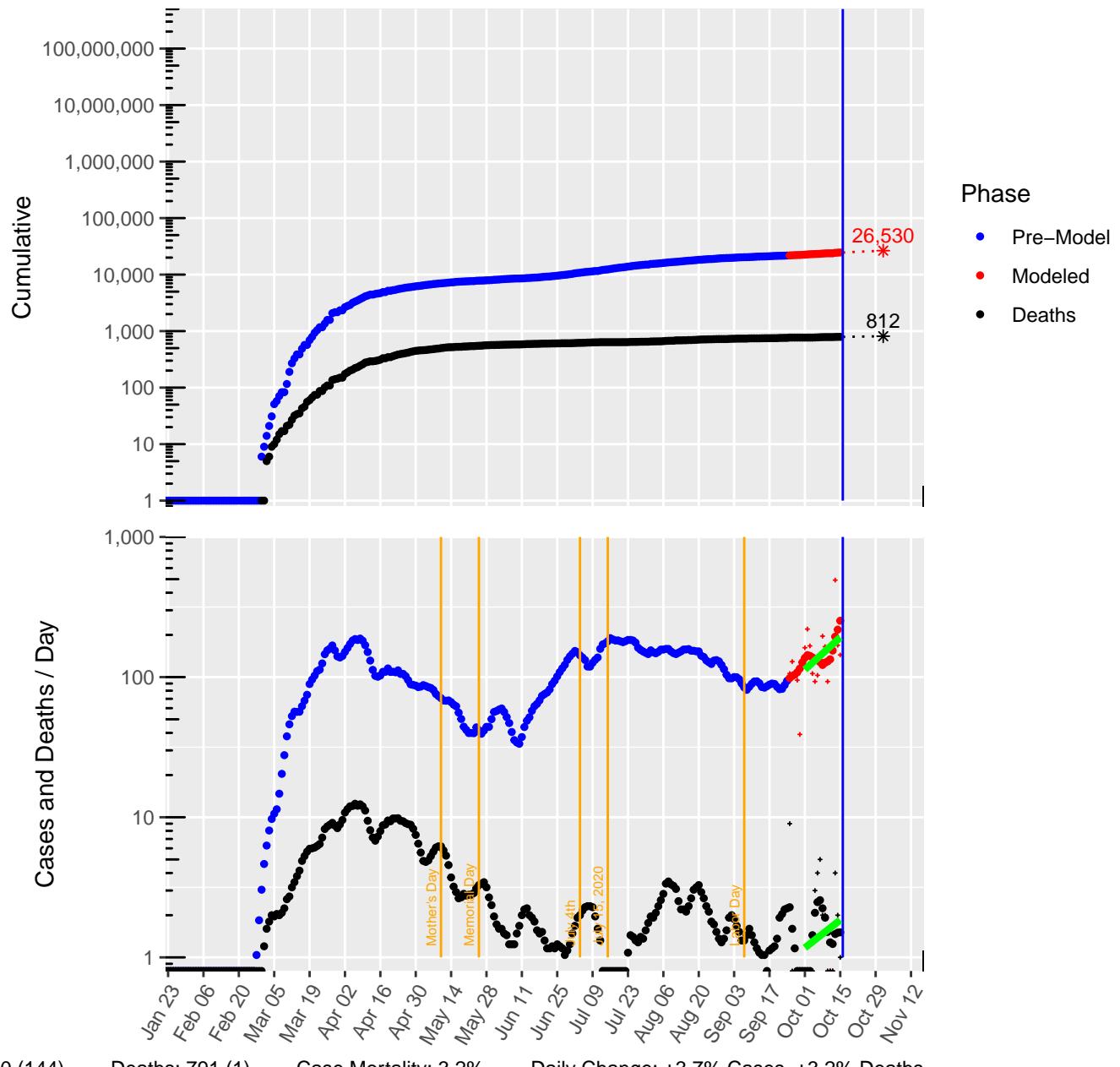
# Bergen County, NJ projection as of 2020-10-16



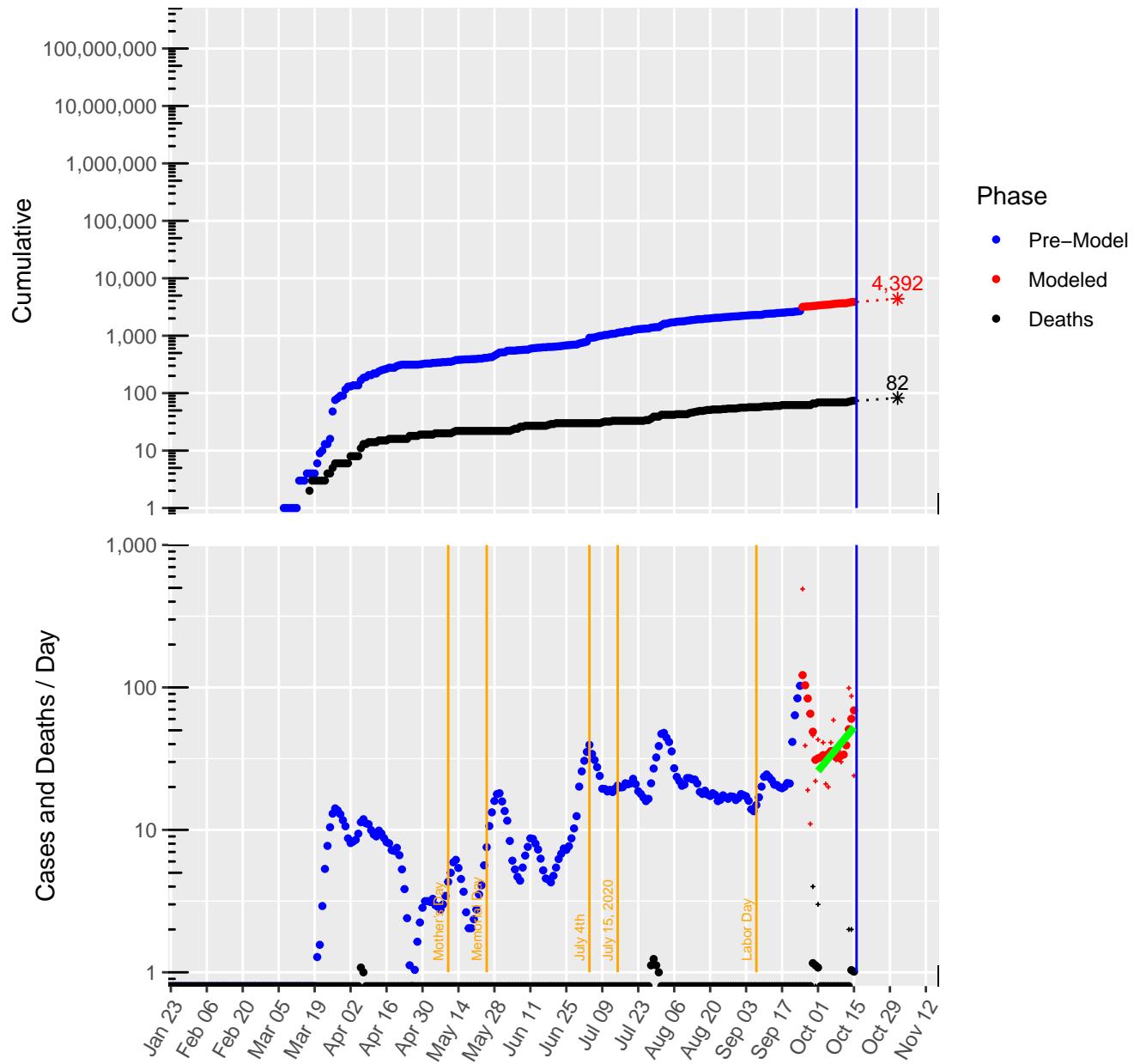
# Hudson County, NJ projection as of 2020-10-16



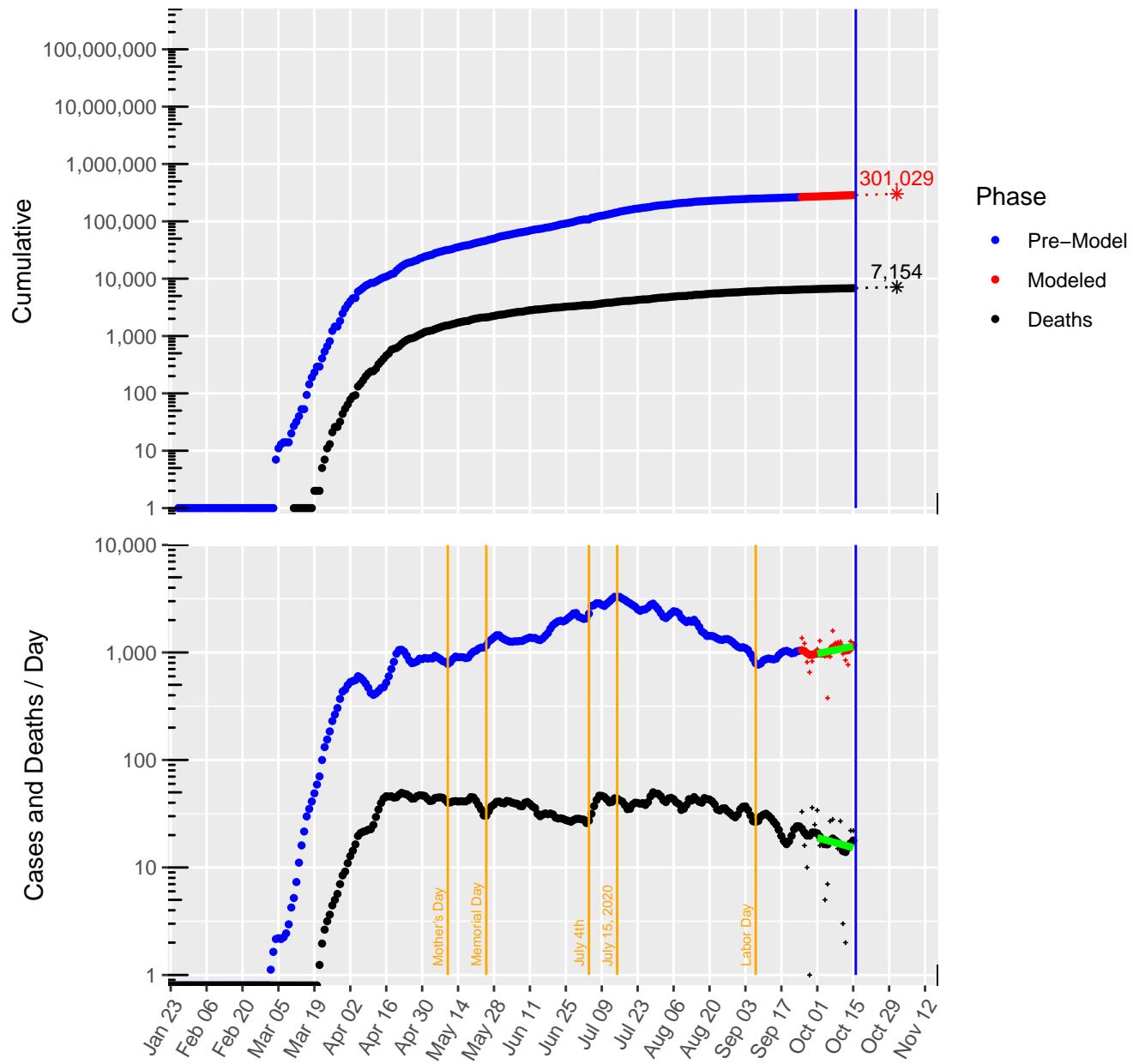
# King County (Seattle) projection as of 2020-10-16



# Clark County, Washington projection as of 2020-10-16

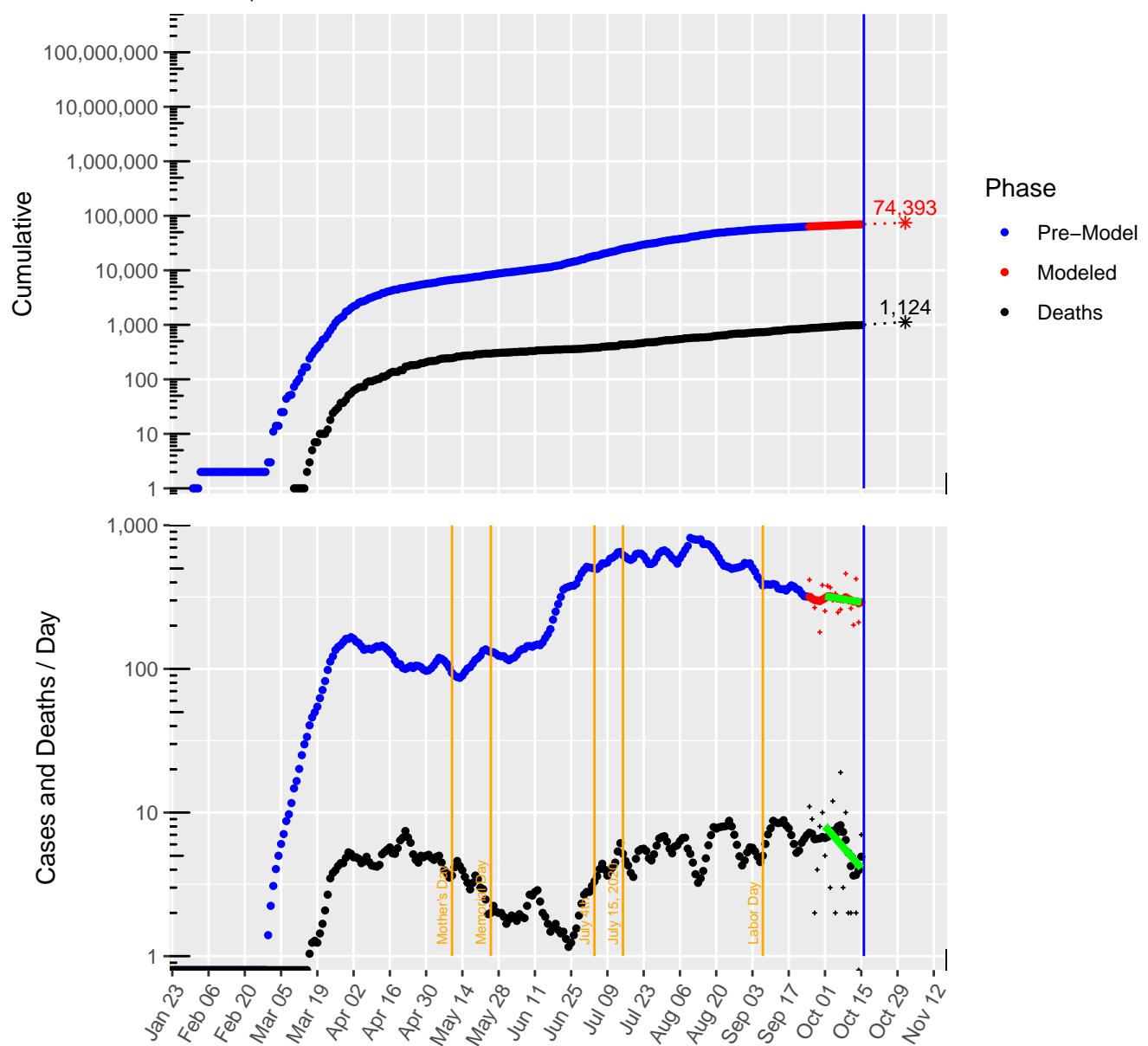


# Los Angeles projection as of 2020-10-16



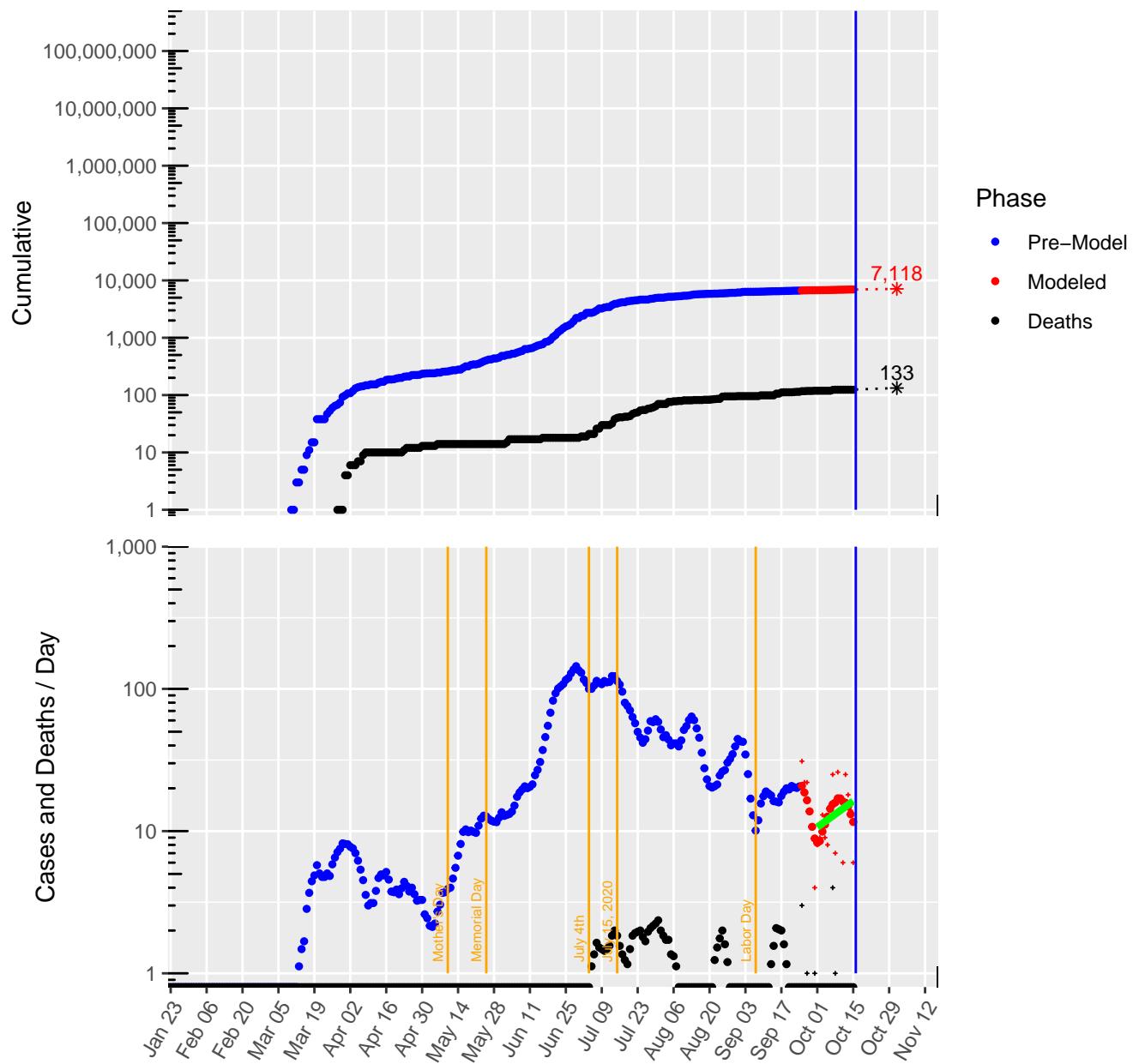
# Bay Area projection as of 2020-10-16

Marin, Napa, San Mateo, San Francisco, Santa Clara, Solano, and Sonoma Counties

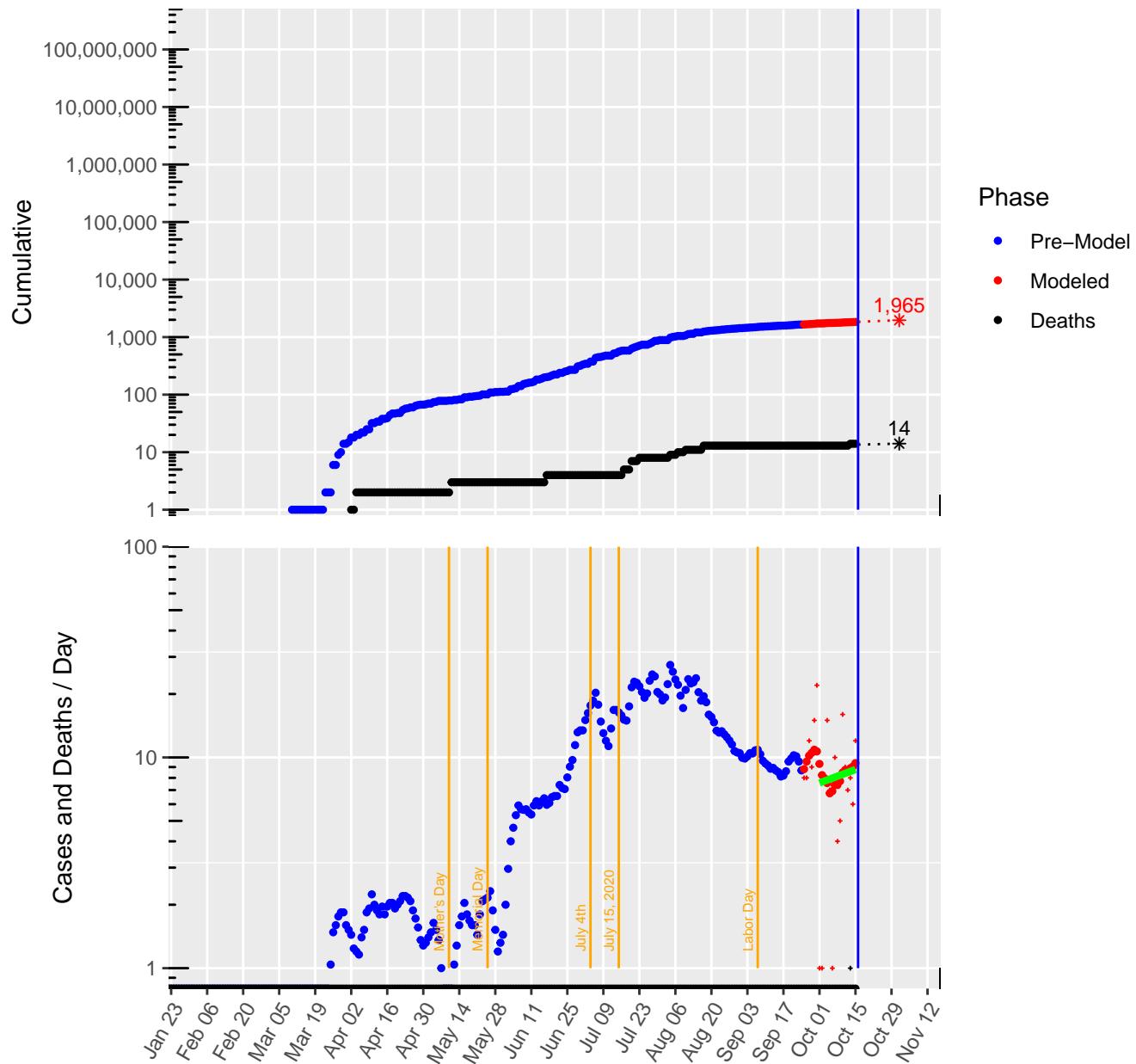


9 (292) — Deaths: 988 (7) — Case Mortality: 1.4% — Daily Change: -0.7% Cases, -4.6% Deaths

# Marin County, California projection as of 2020-10-16

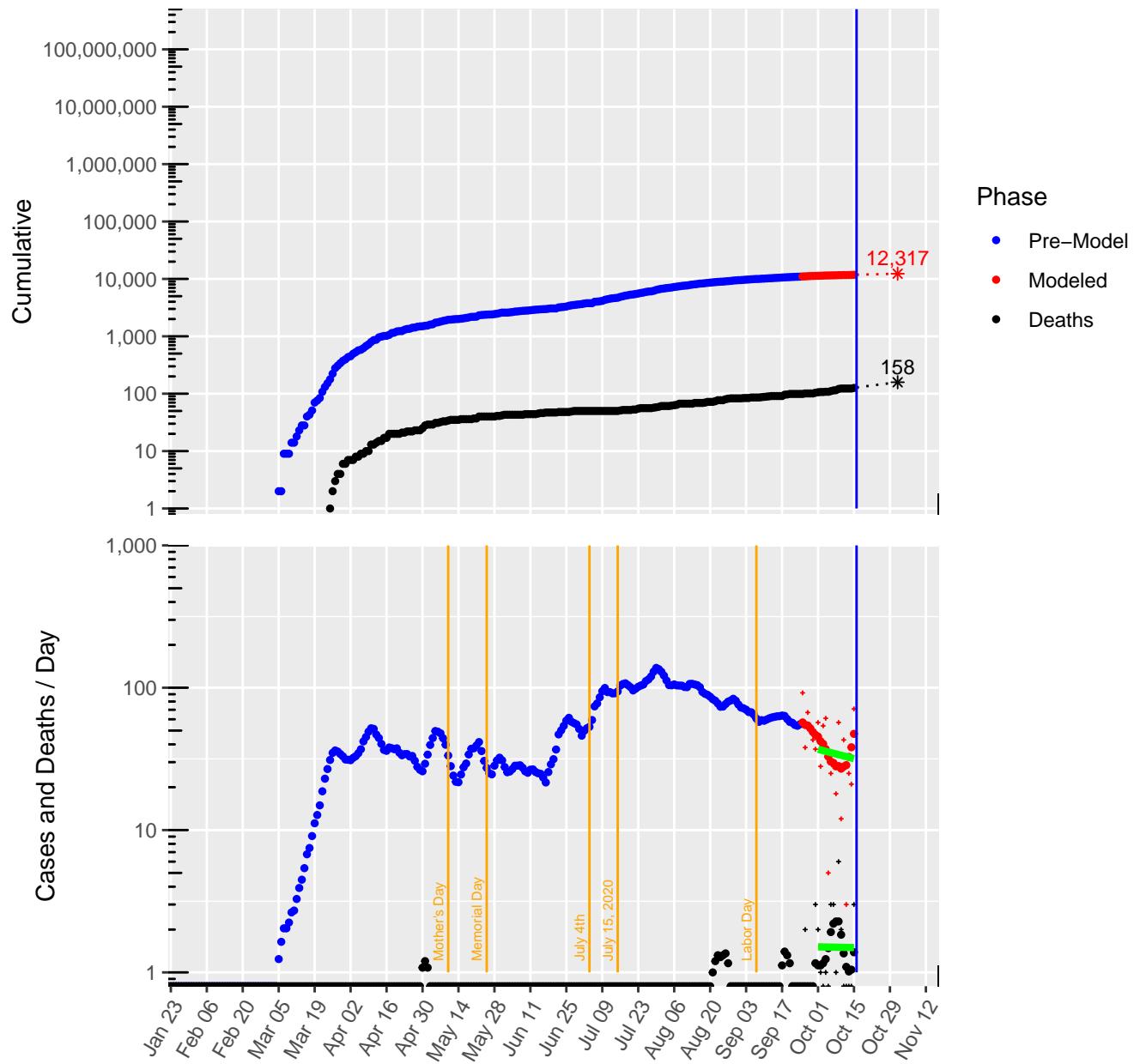


# Napa County, California projection as of 2020-10-16

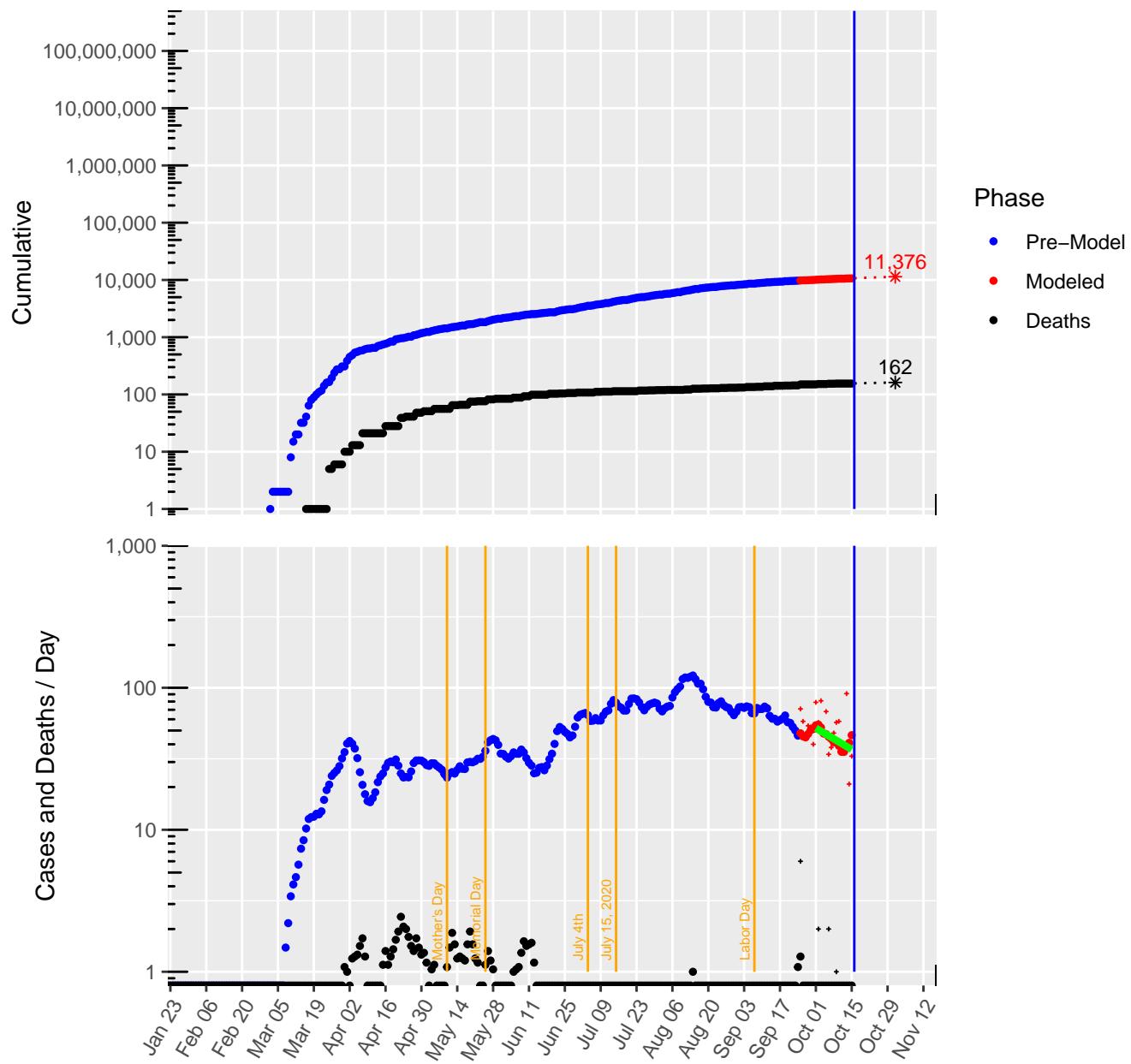


37 (12) --- Deaths: 14 (0) --- Case Mortality: 0.8% --- Daily Change: +1.0% Cases, +24.6% Deaths

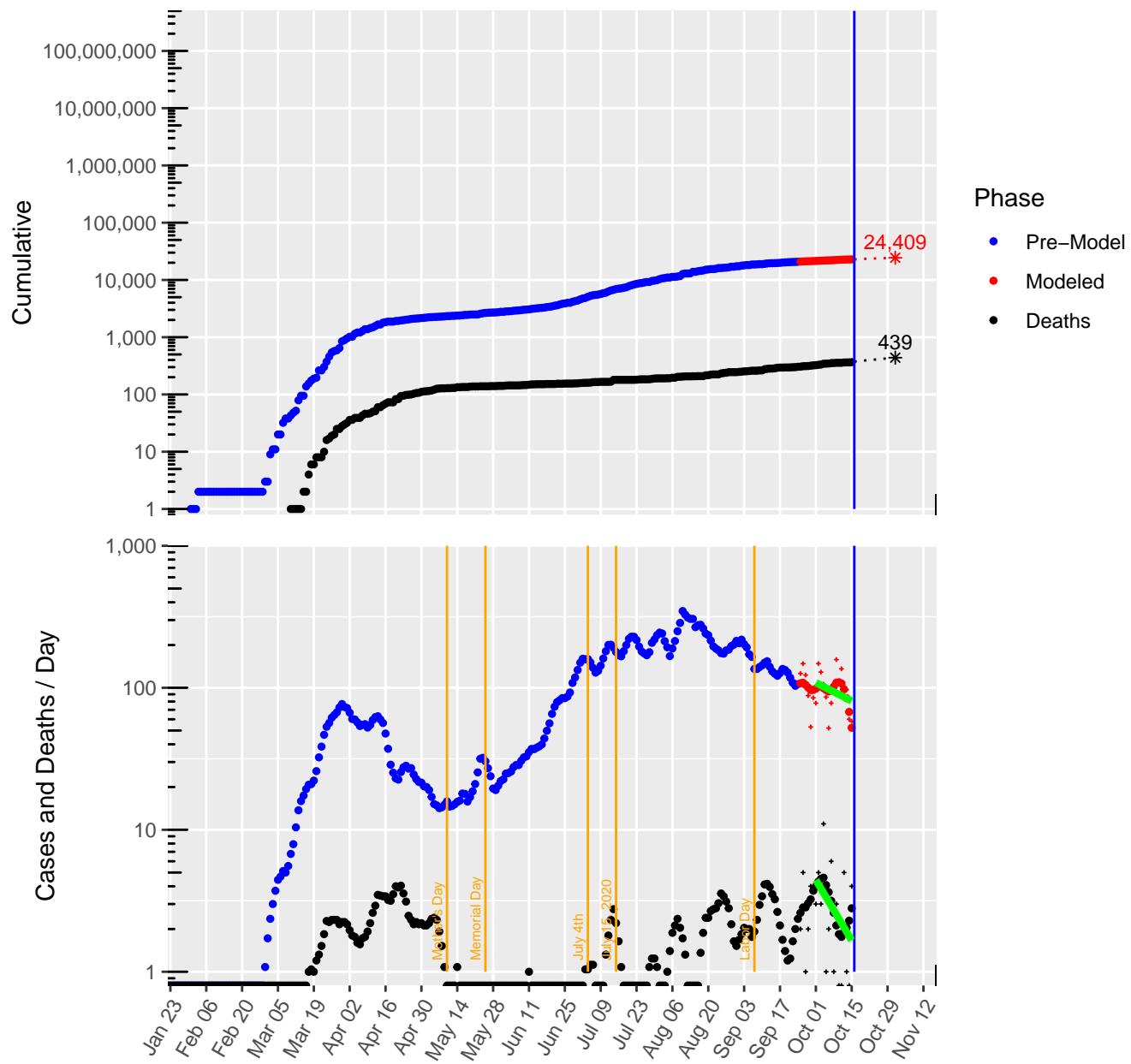
# San Francisco projection as of 2020-10-16



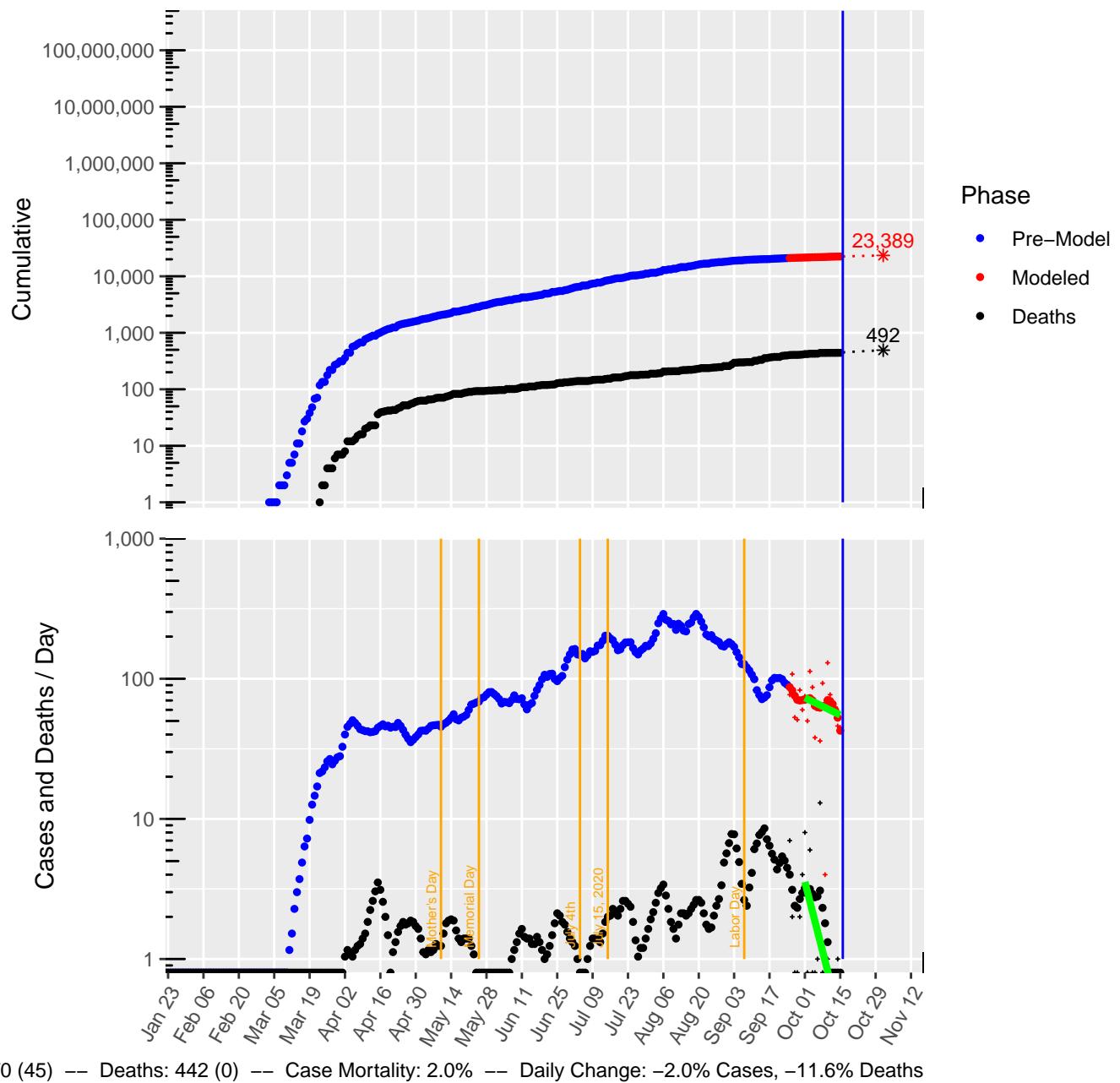
# San Mateo County, California projection as of 2020-10-16



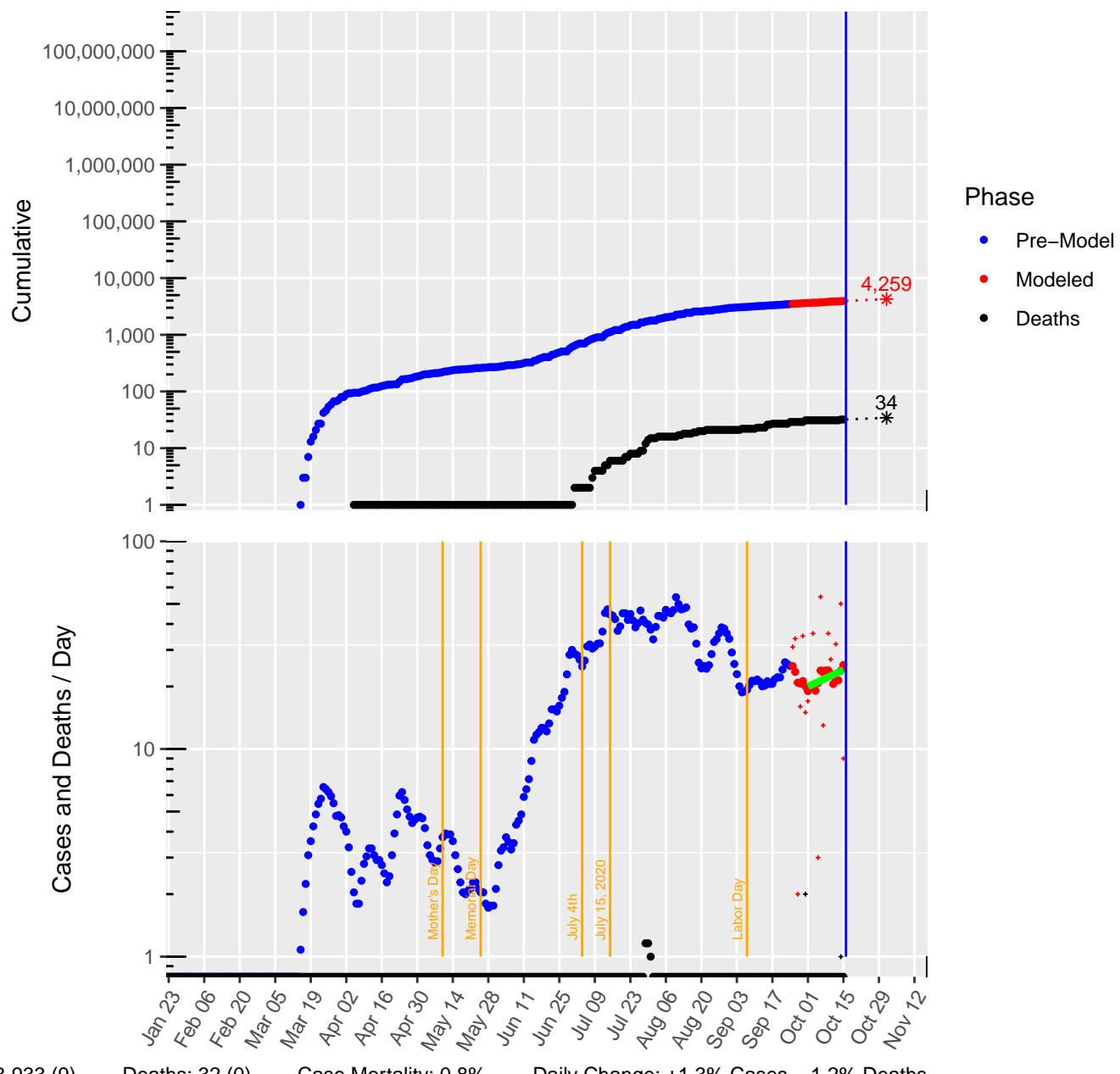
# Santa Clara County, California projection as of 2020-10-16



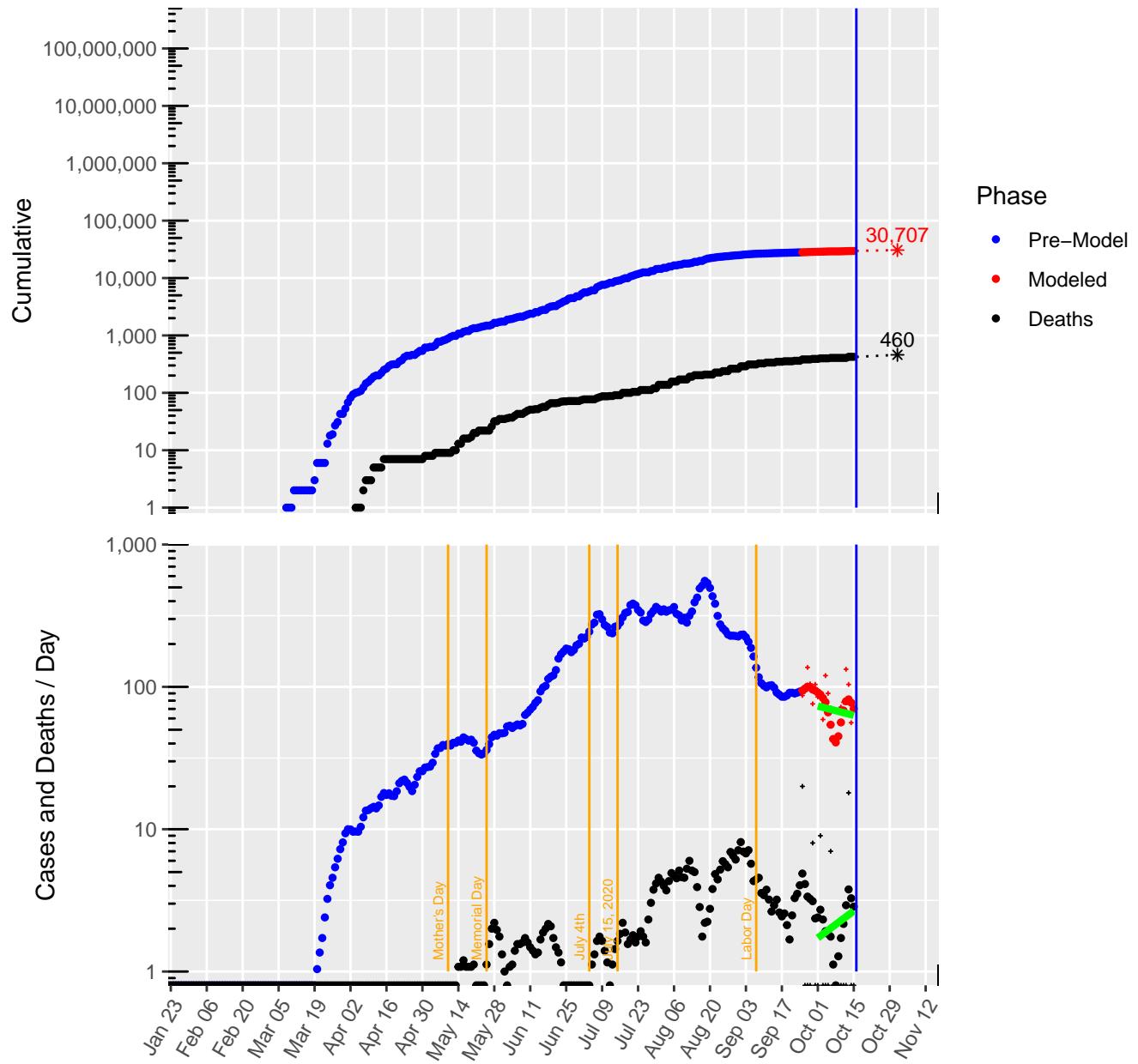
# Alameda County, California projection as of 2020-10-16



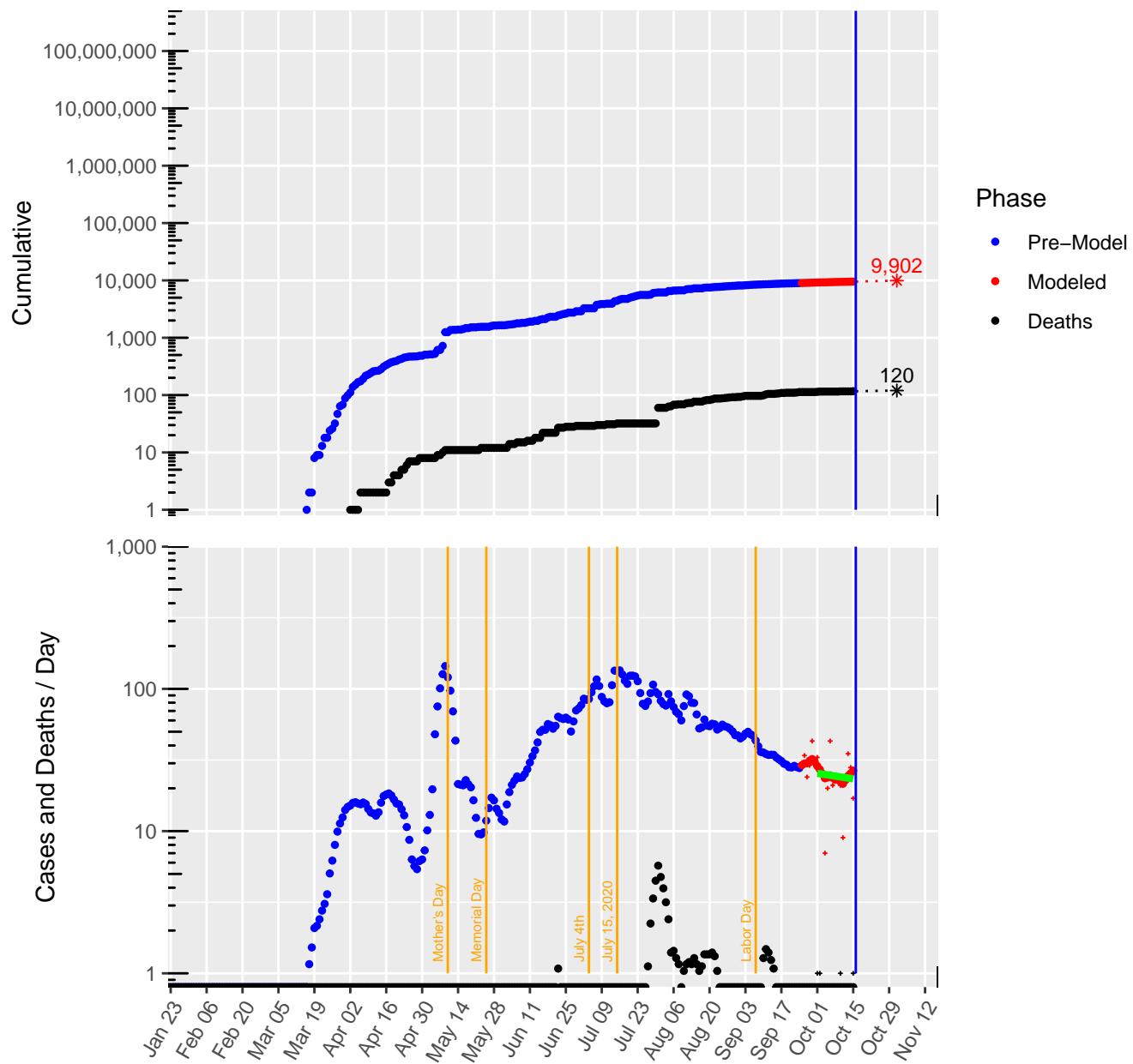
# San Luis Obispo, California projection as of 2020-10-16



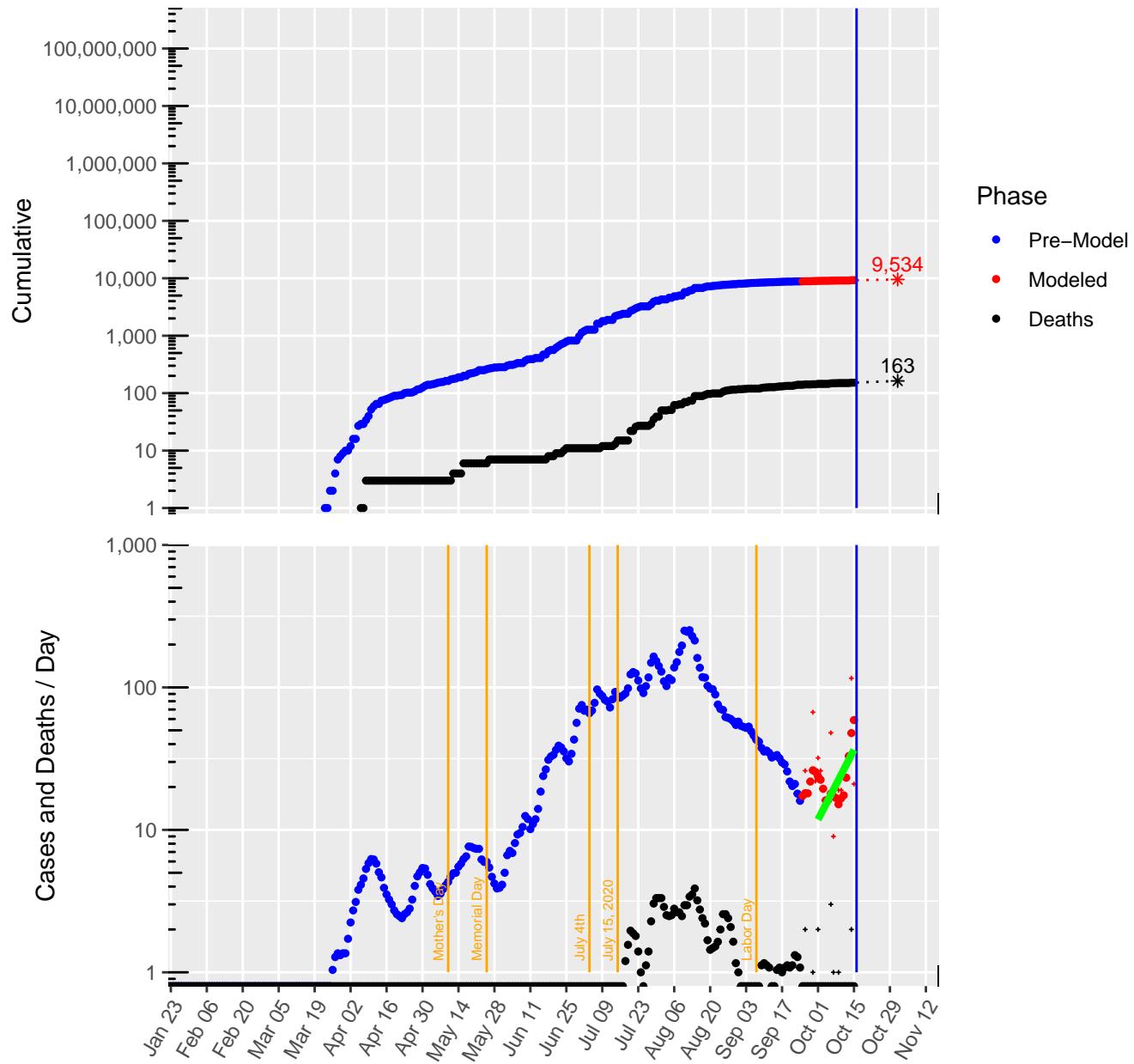
# Fresno, California projection as of 2020-10-16



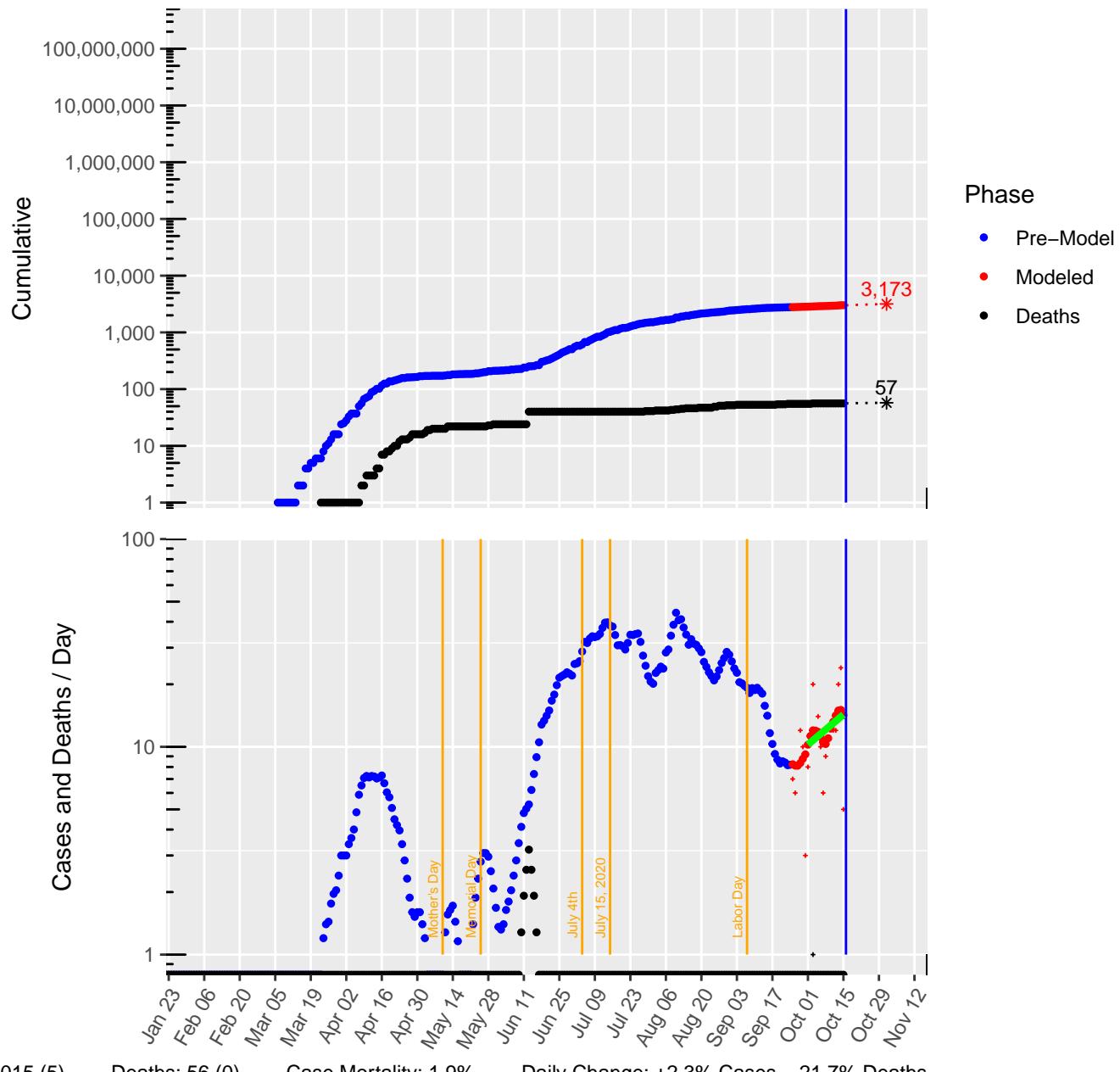
# Santa Barbara County, California projection as of 2020-10-16



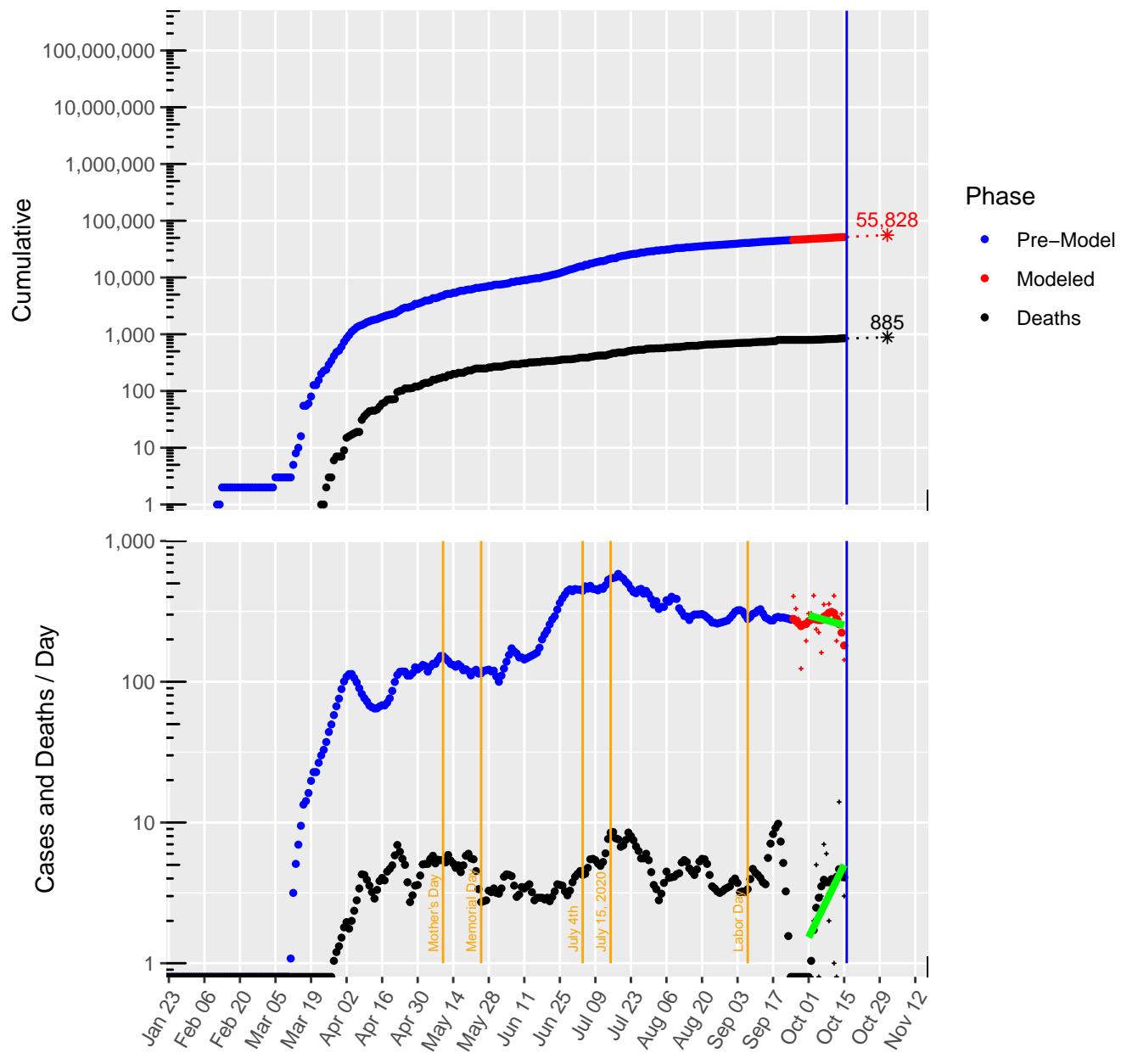
# Merced County, California projection as of 2020-10-16



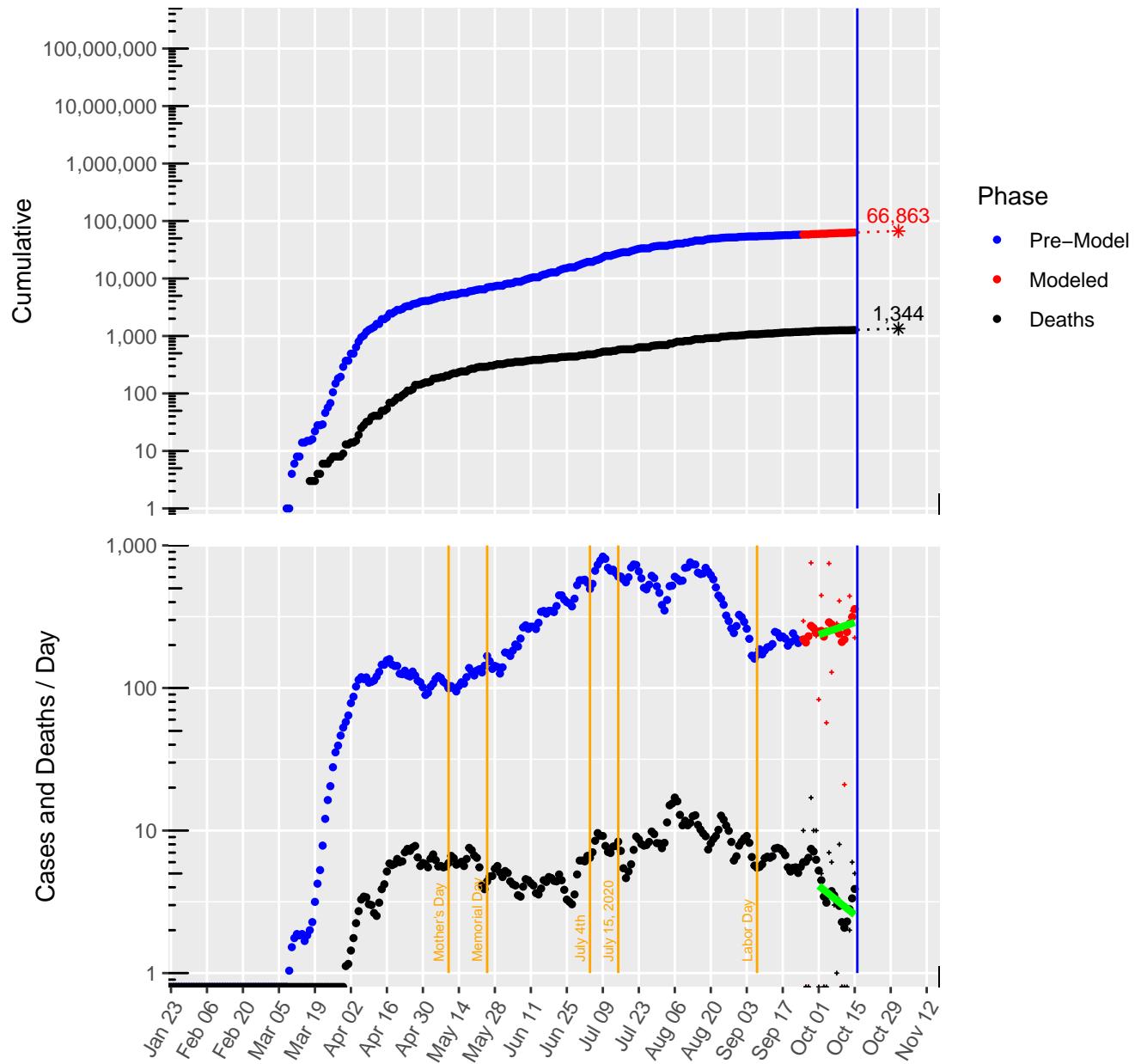
# Yolo County, California projection as of 2020-10-16



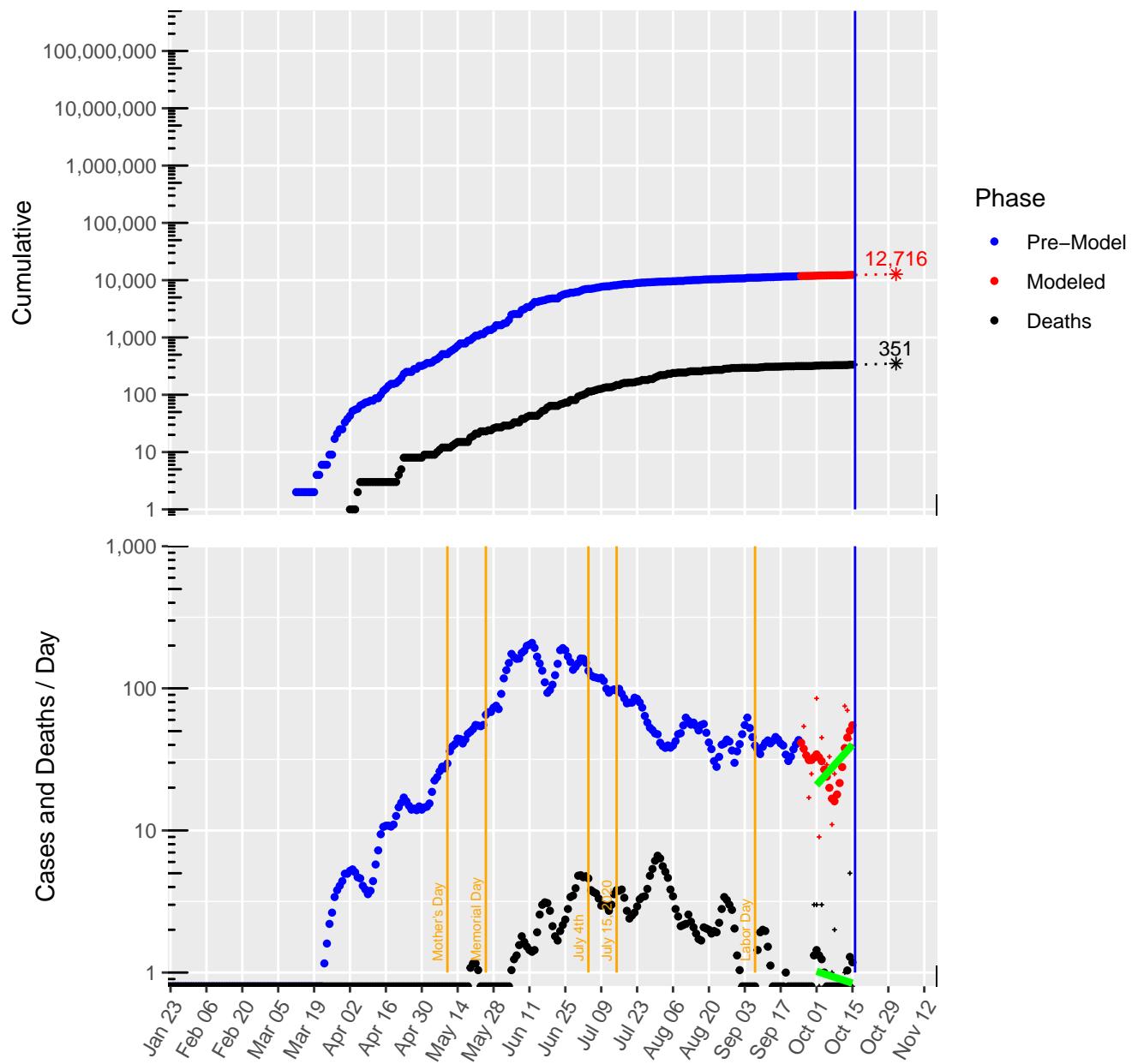
# San Diego County projection as of 2020-10-16



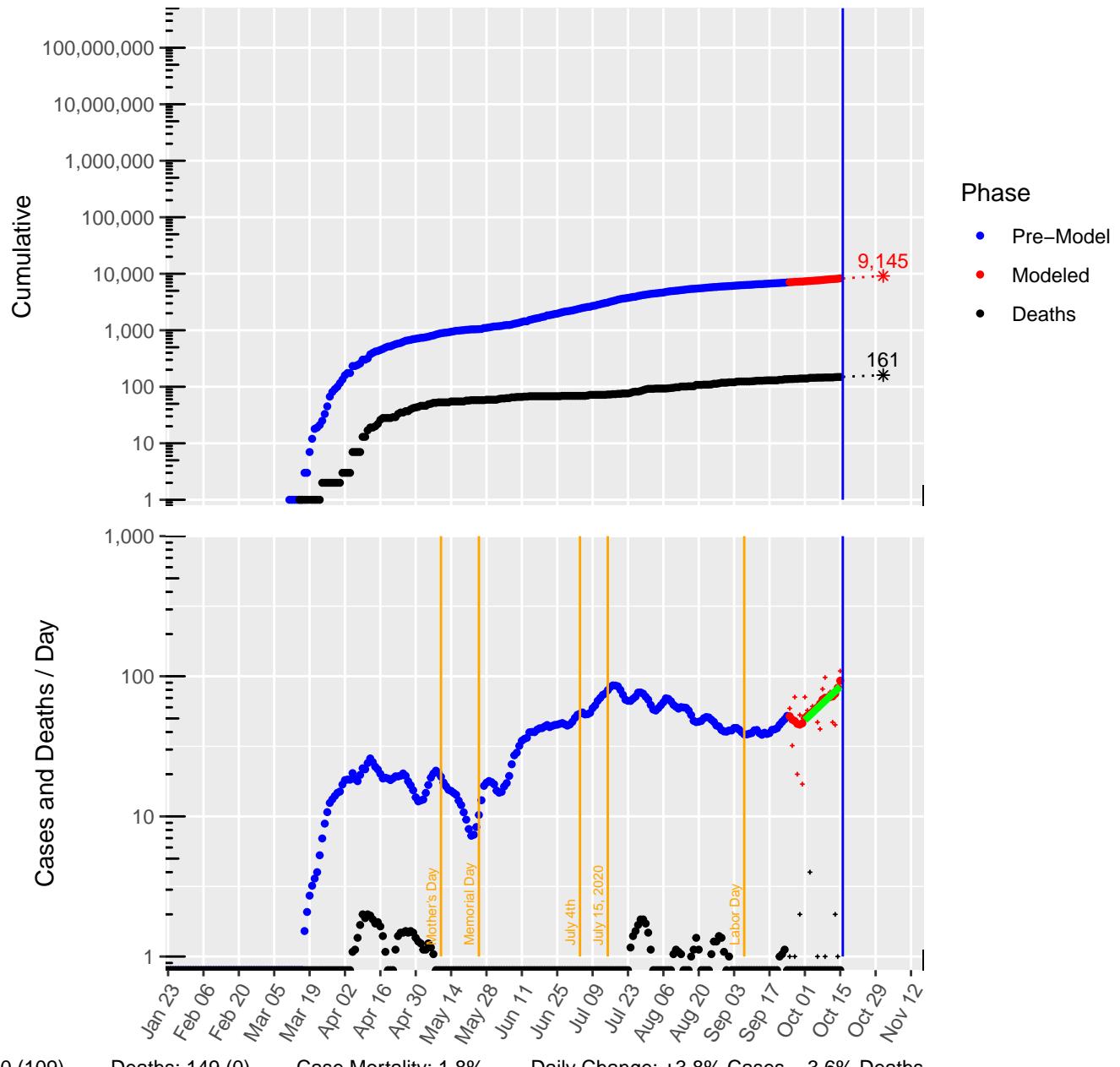
# Riverside County projection as of 2020-10-16



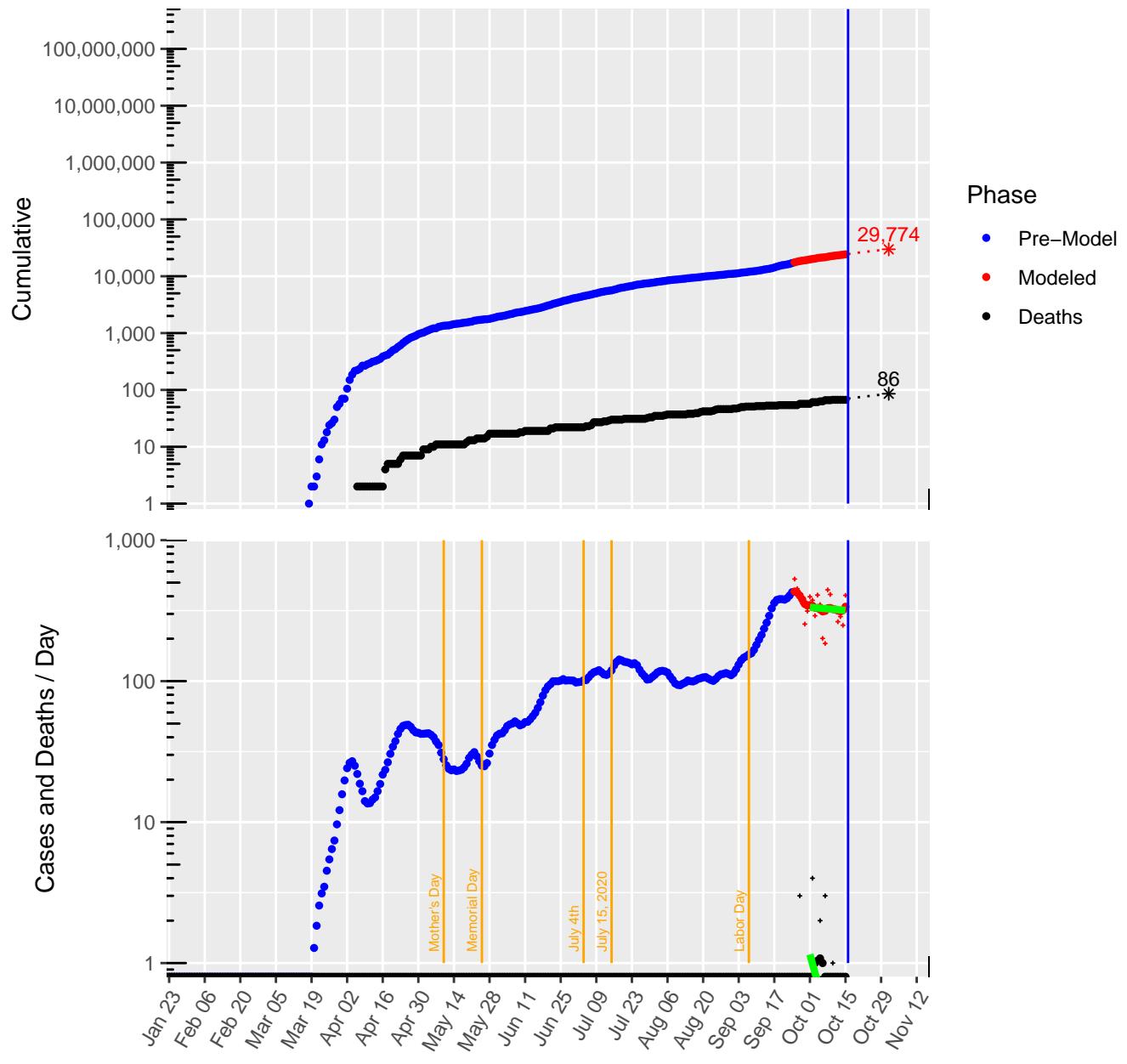
# Imperial County projection as of 2020-10-16



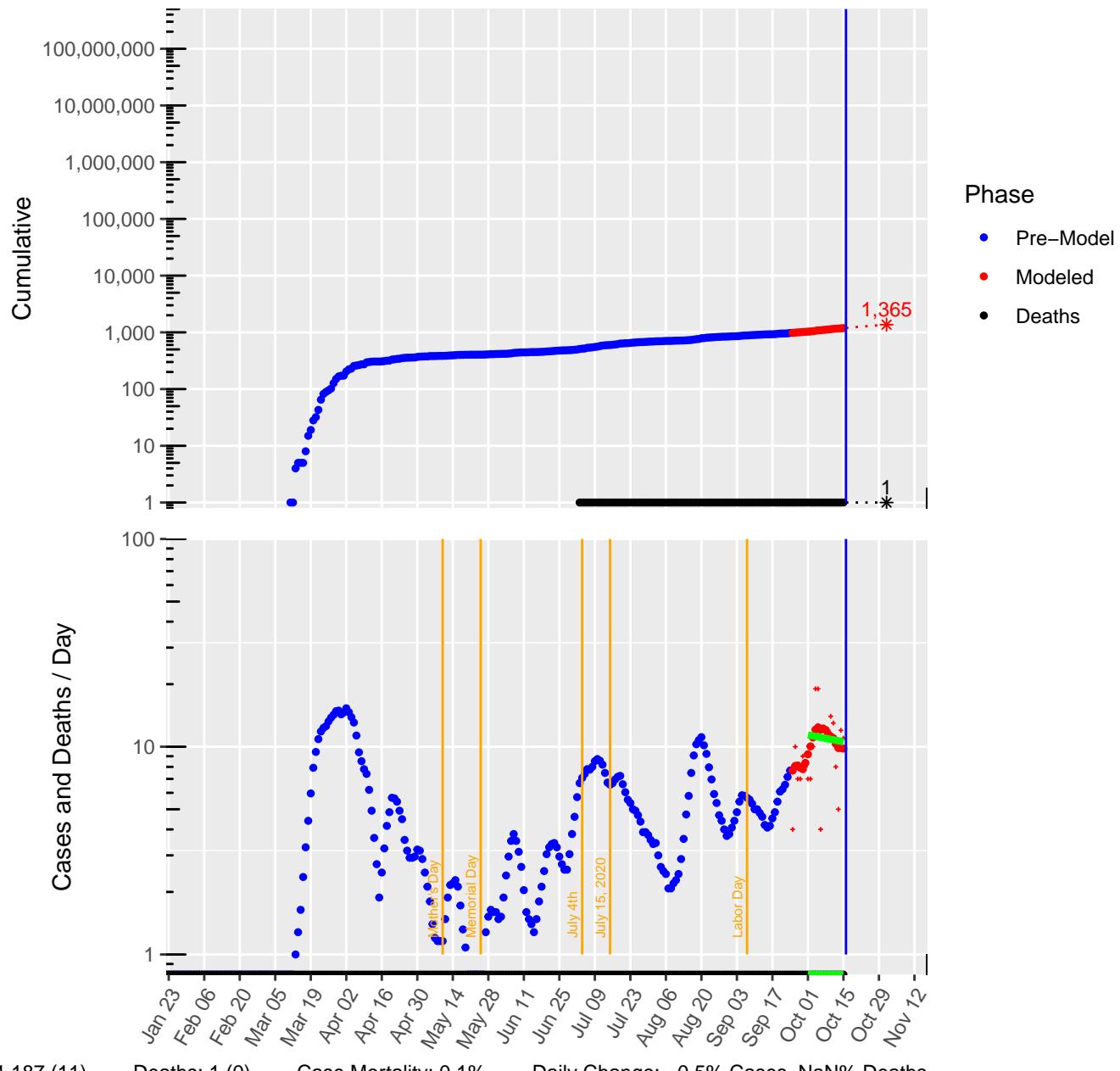
# Multnomah County (Portland) projection as of 2020-10-16



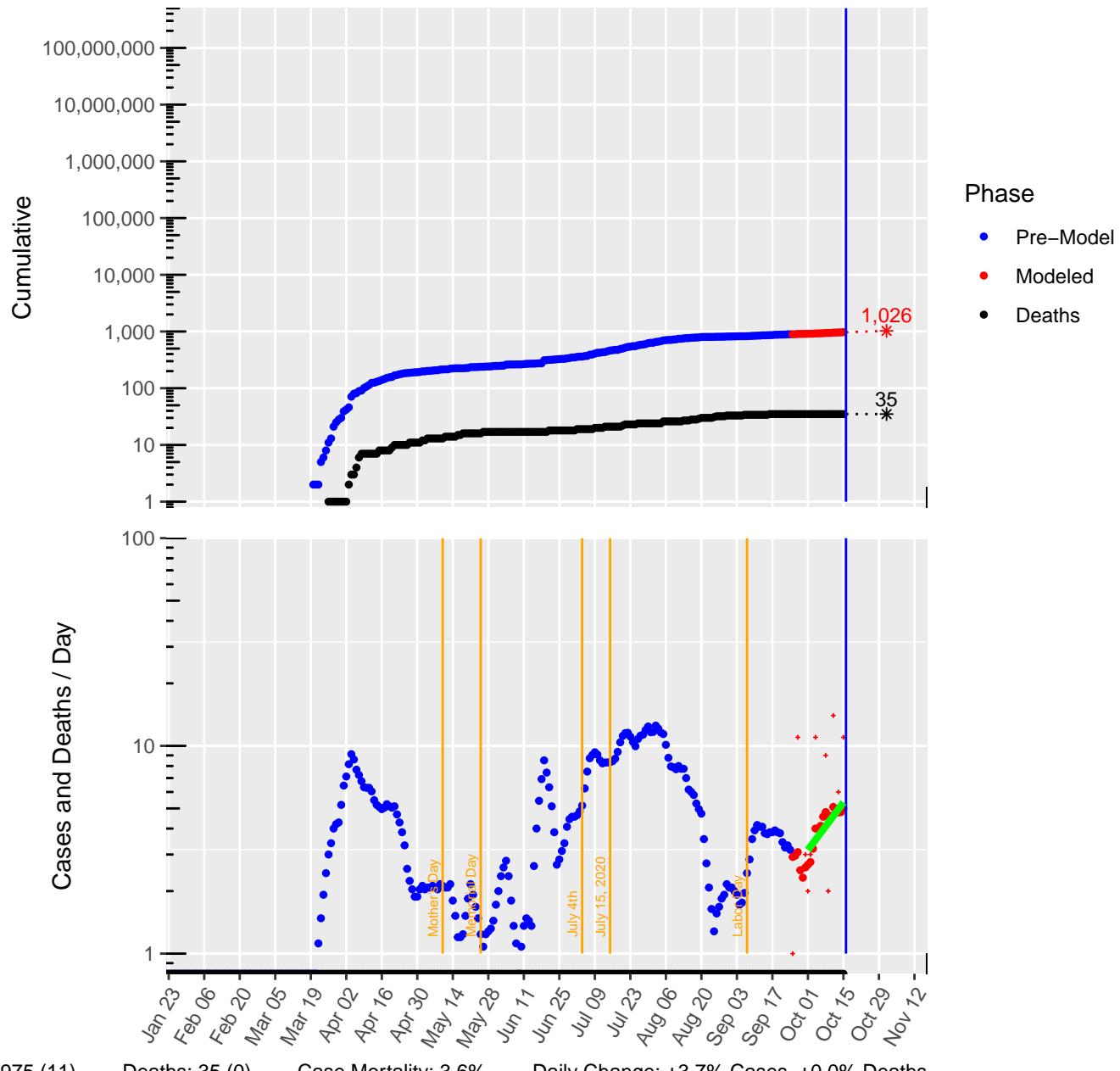
# Utah County projection as of 2020-10-16



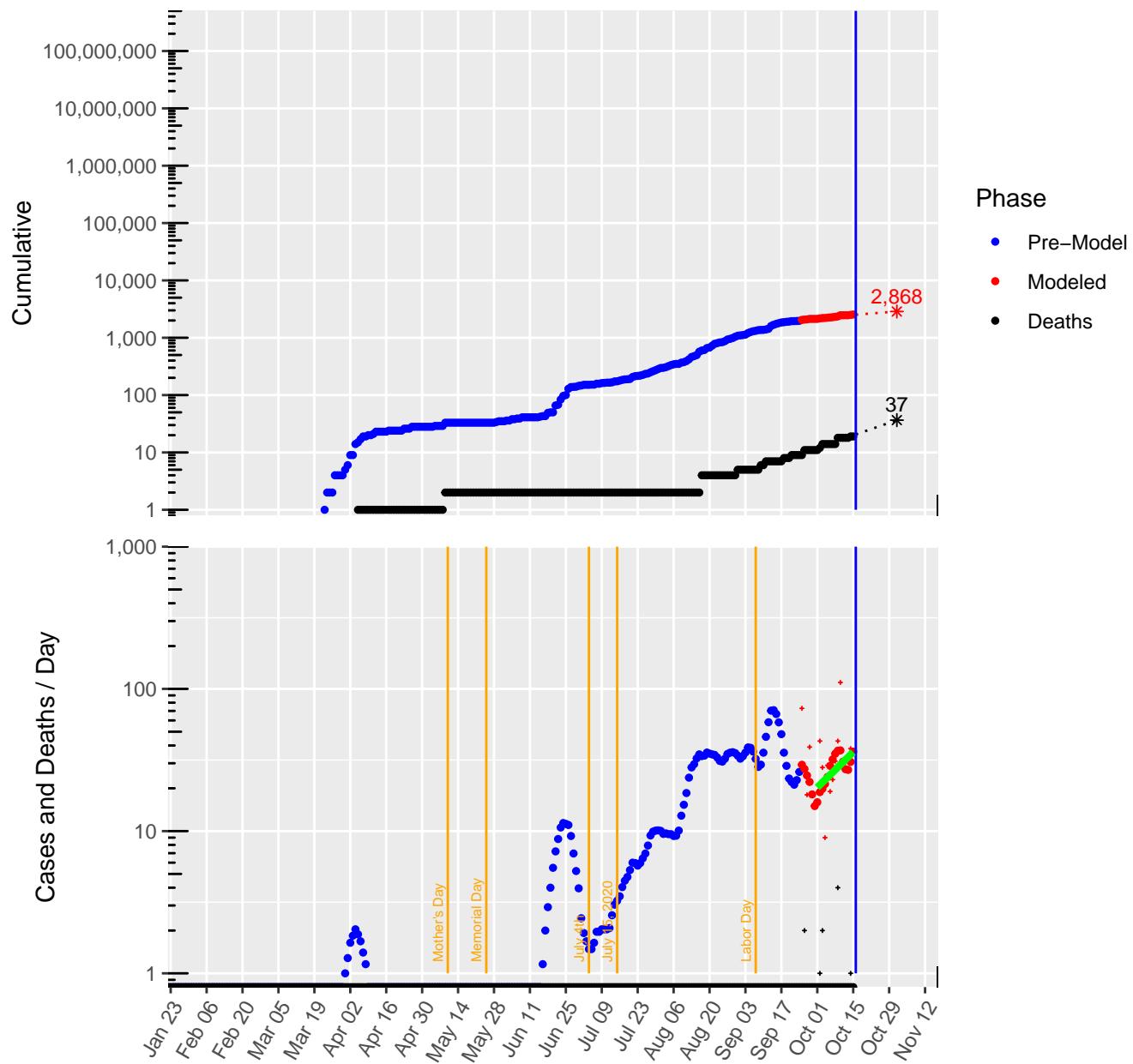
# Summit County, Utah projection as of 2020-10-16



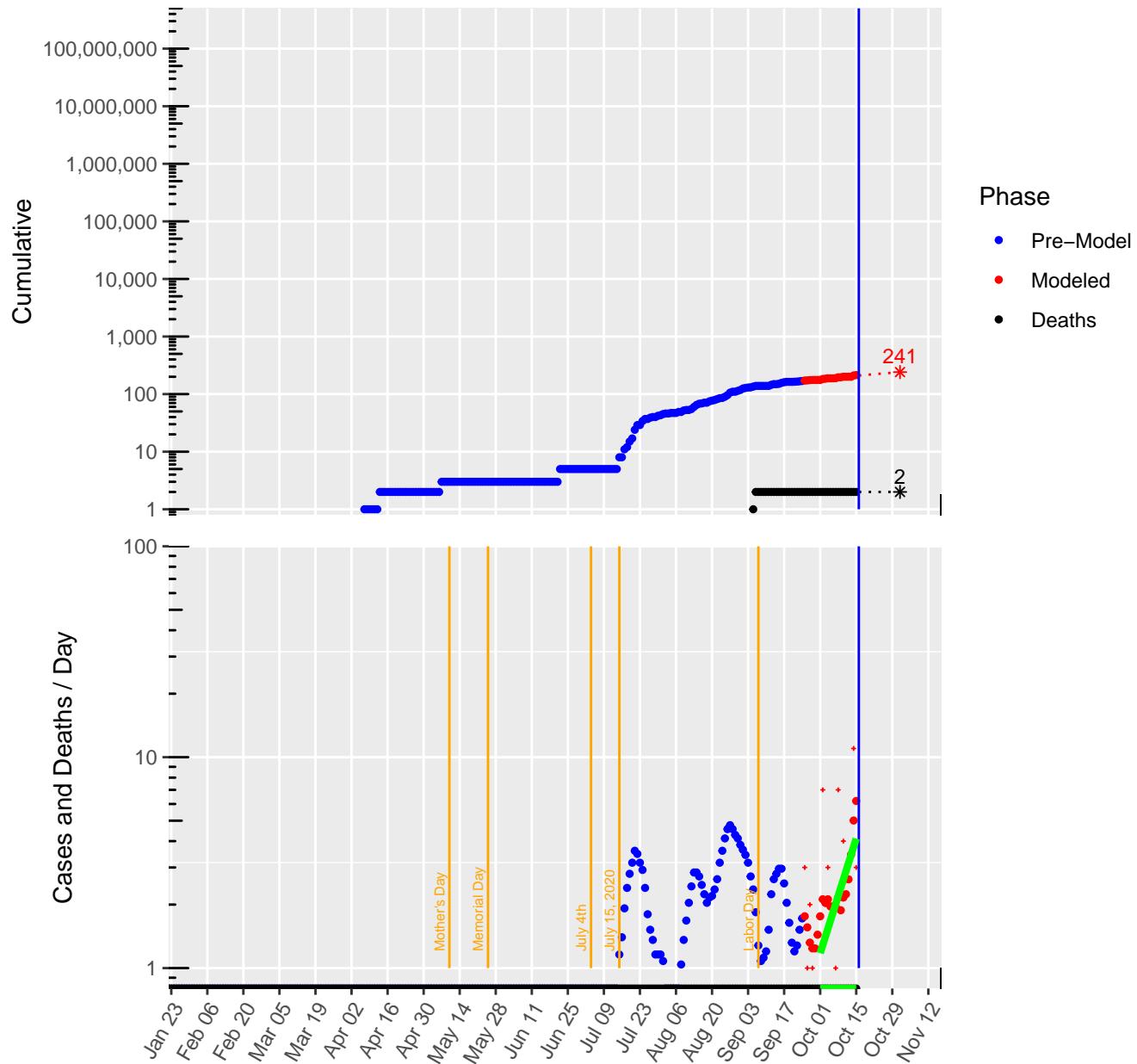
# De Soto Parish, Louisiana projection as of 2020-10-16



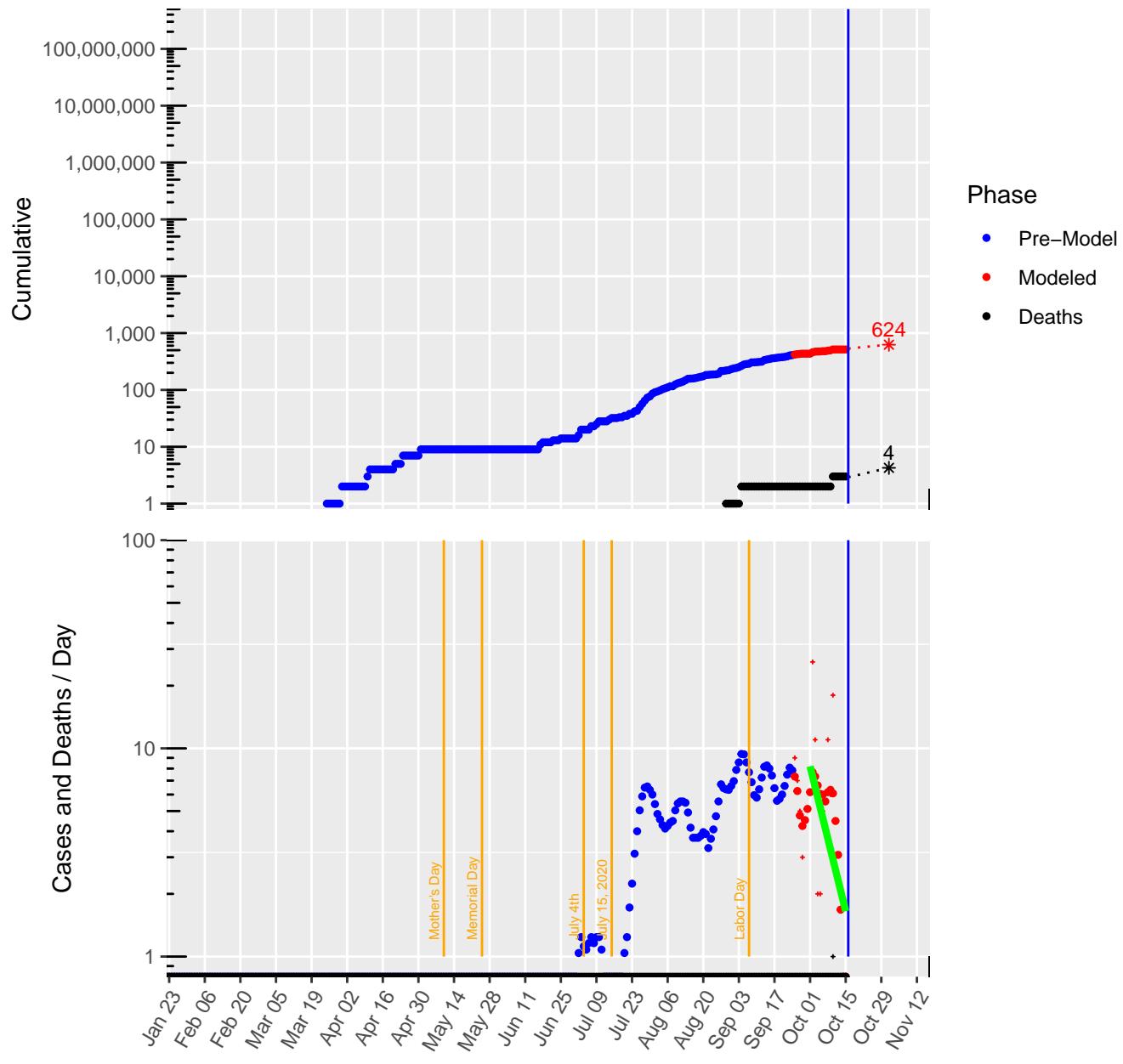
# St. Francois County, Missouri projection as of 2020-10-16



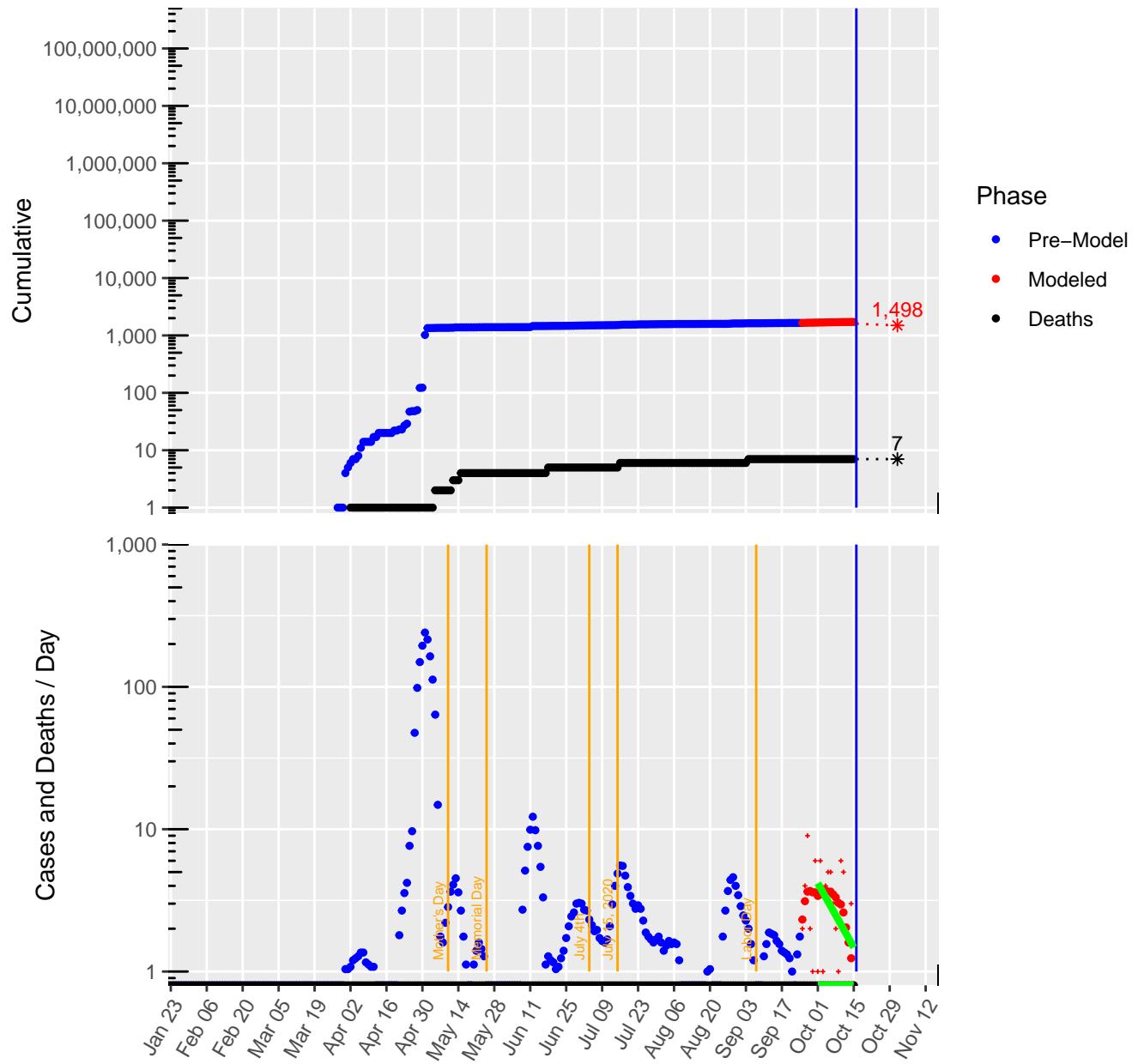
# Howard County, Missouri projection as of 2020-10-16



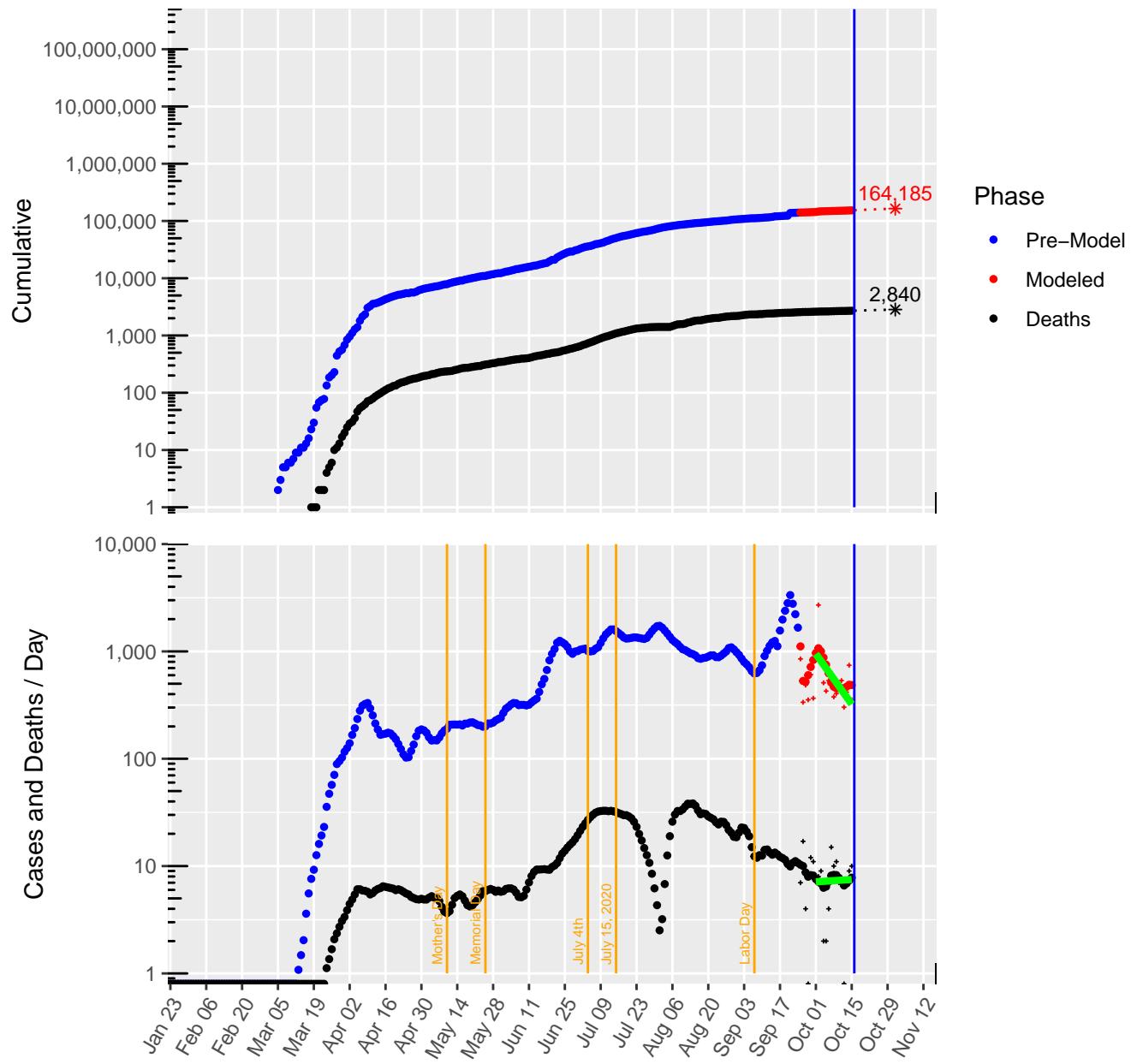
# Cooper County, Missouri projection as of 2020-10-16



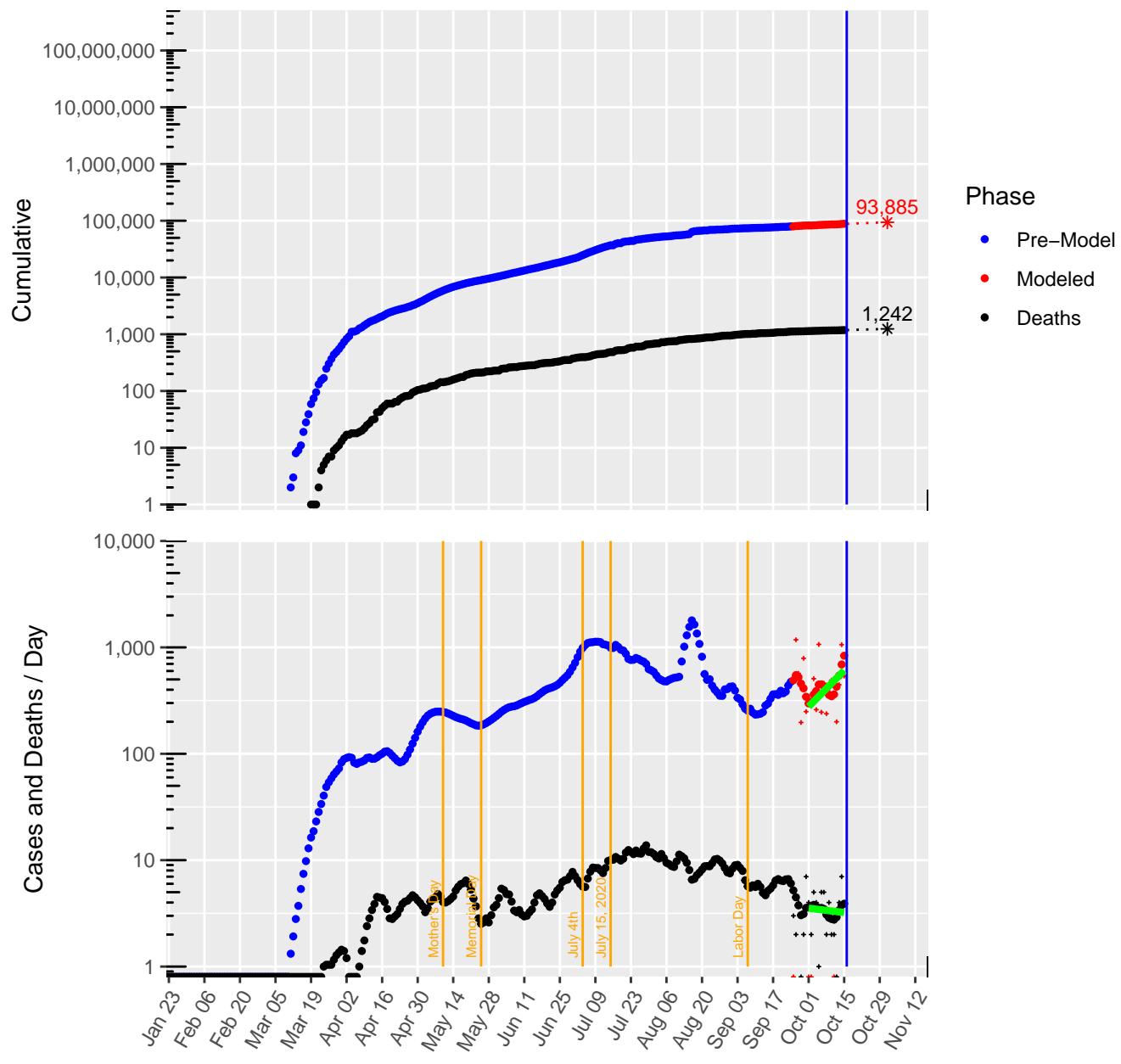
# Trousdale County, Tennessee projection as of 2020-10-16



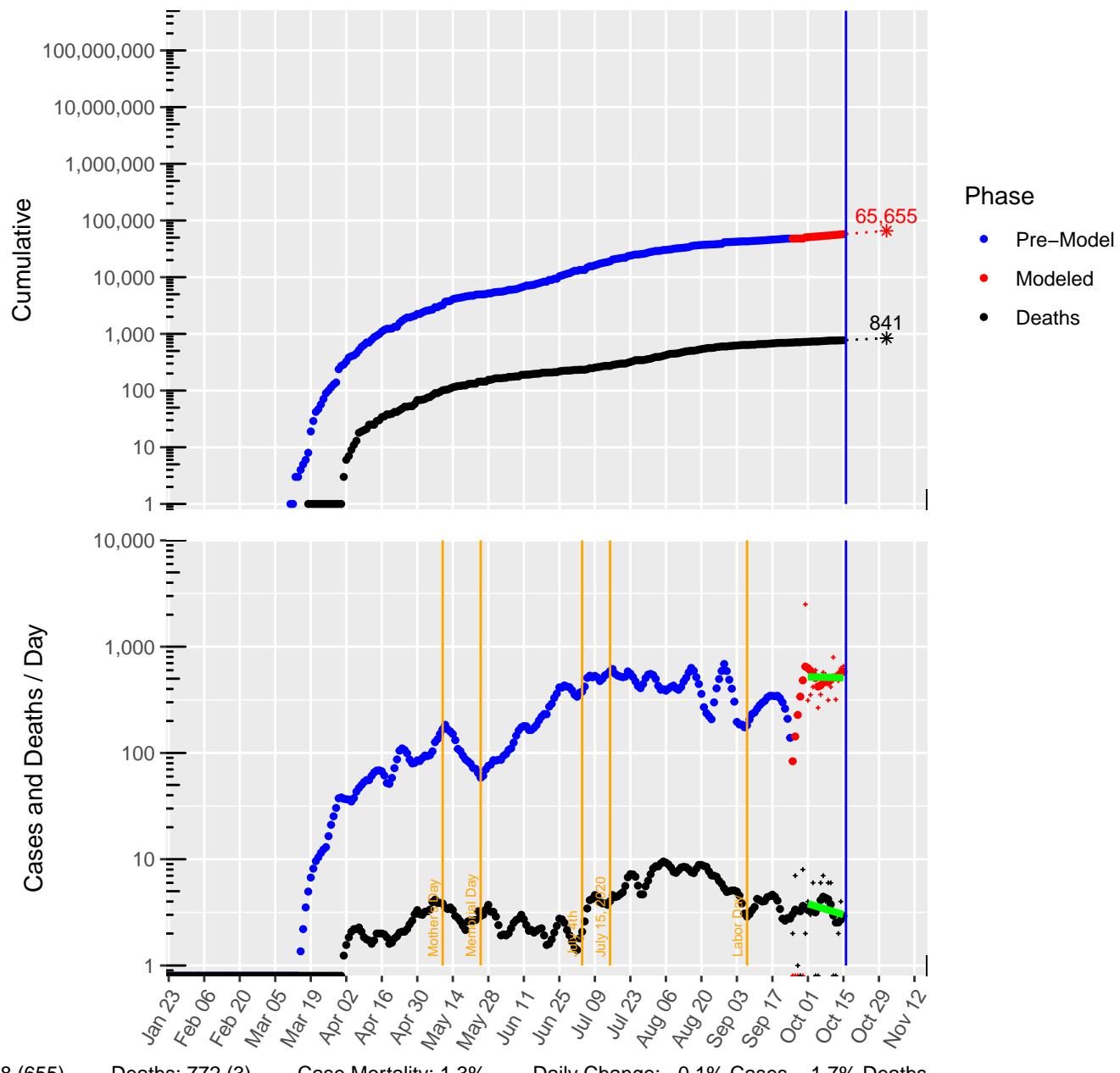
# Harris County (Houston) projection as of 2020-10-16



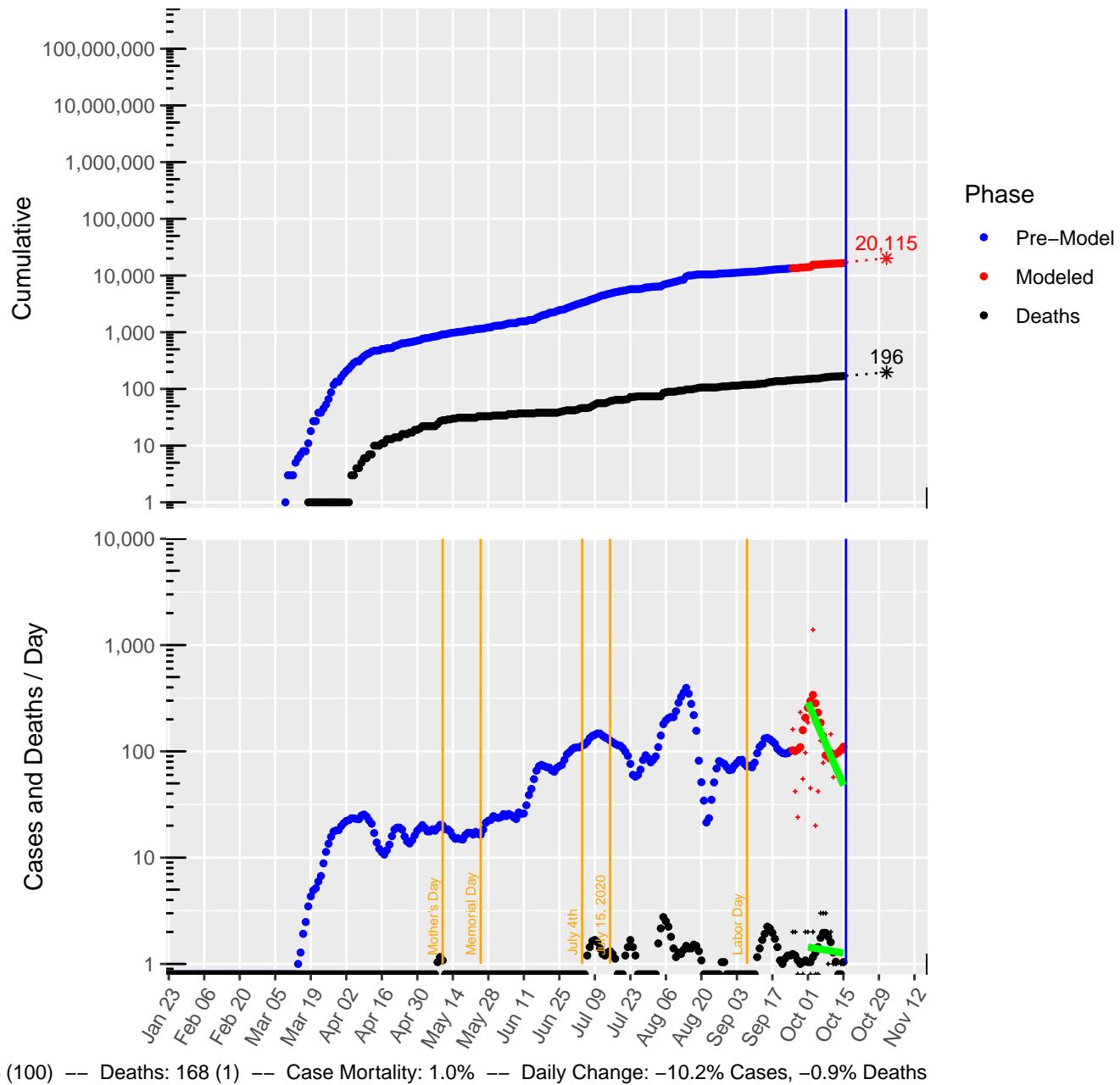
# Dallas, Texas projection as of 2020-10-16



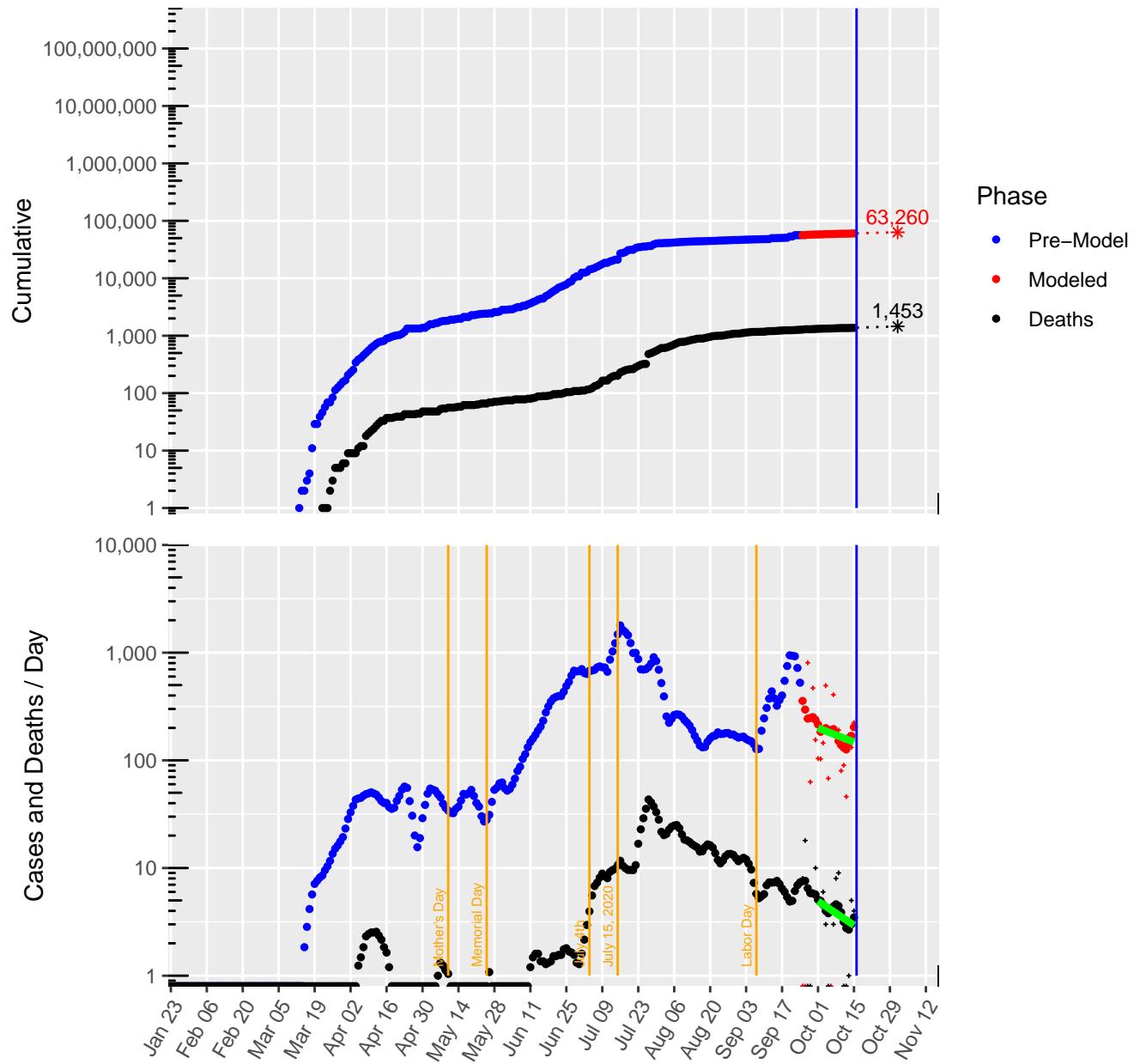
# Tarrant County (Fort Worth) projection as of 2020-10-16



# Collin County, Texas projection as of 2020-10-16

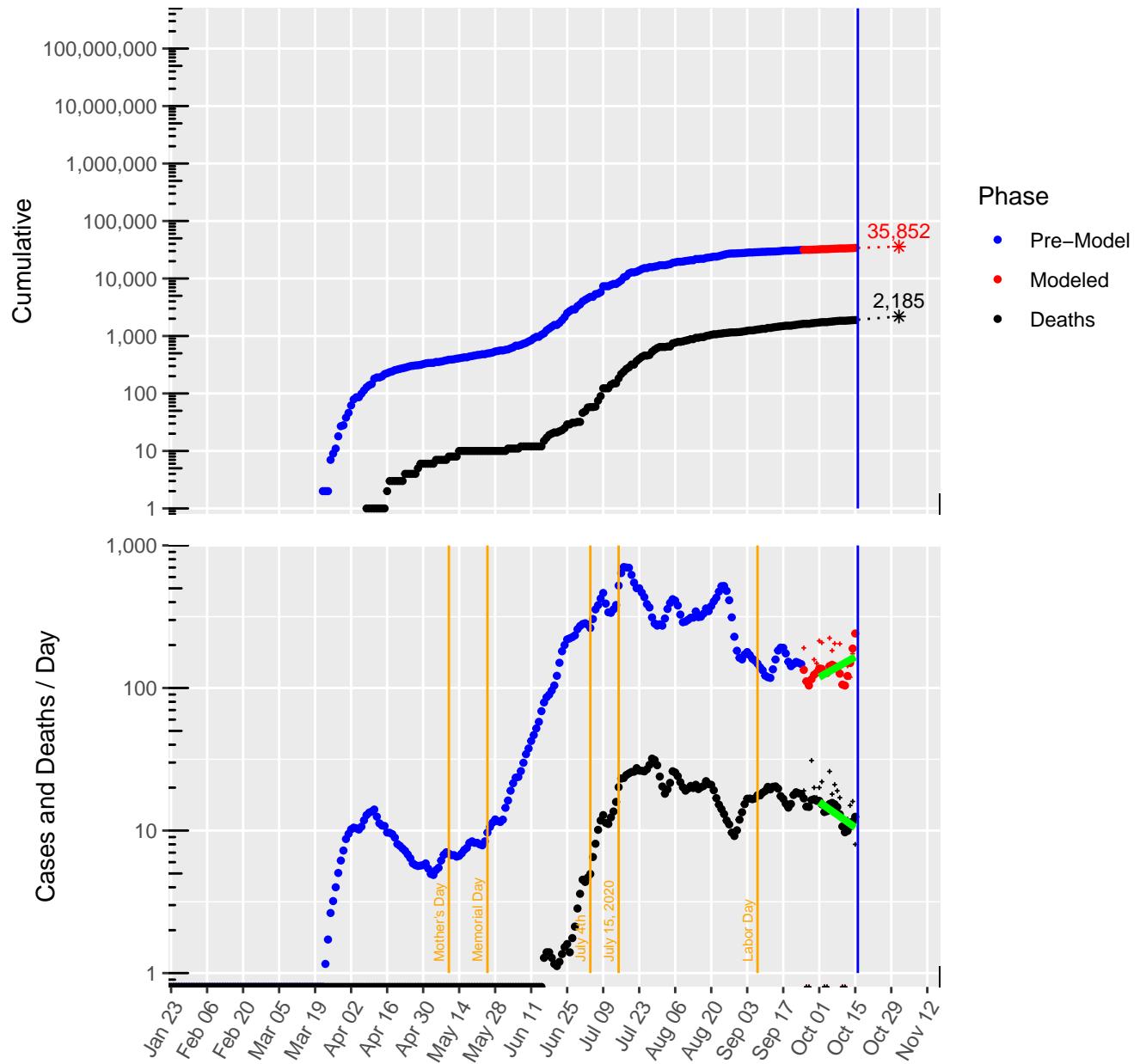


# Bexar County (San Antonio) projection as of 2020-10-16

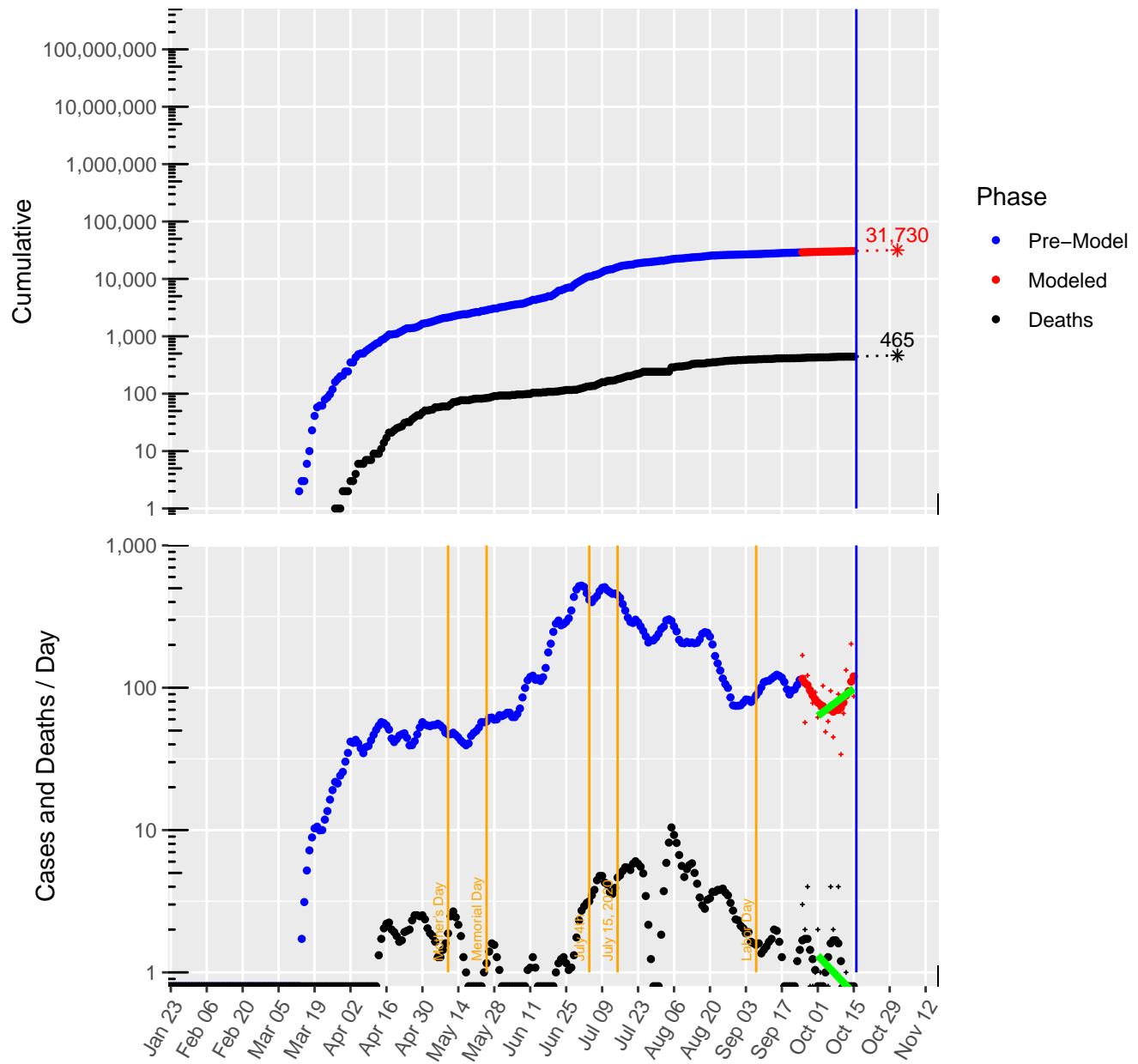


(224) -- Deaths: 1,370 (4) -- Case Mortality: 2.3% -- Daily Change: -2.1% Cases, -3.6% Deaths

# Hidalgo County, Texas projection as of 2020-10-16

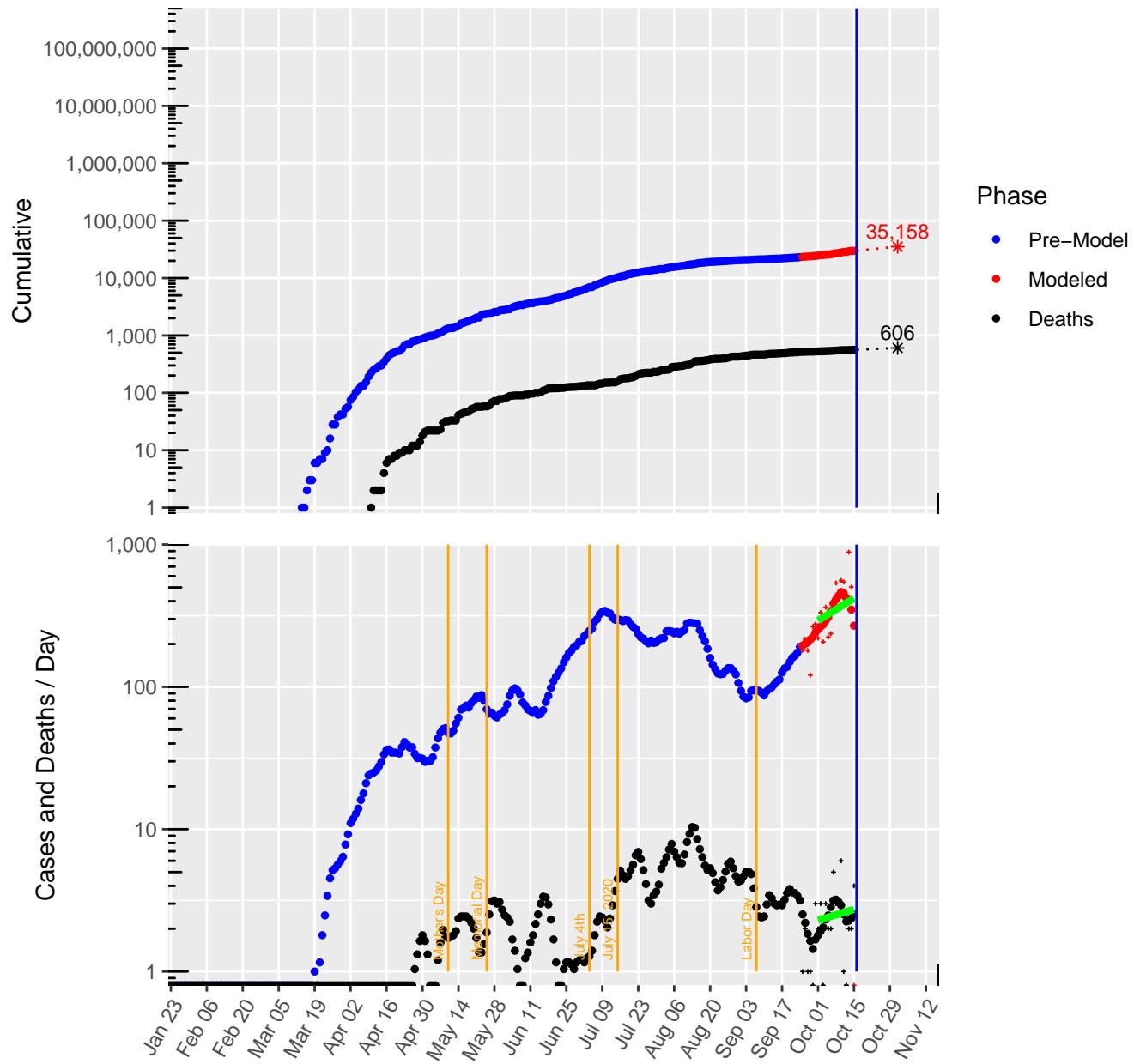


# Travis County (Austin) projection as of 2020-10-16

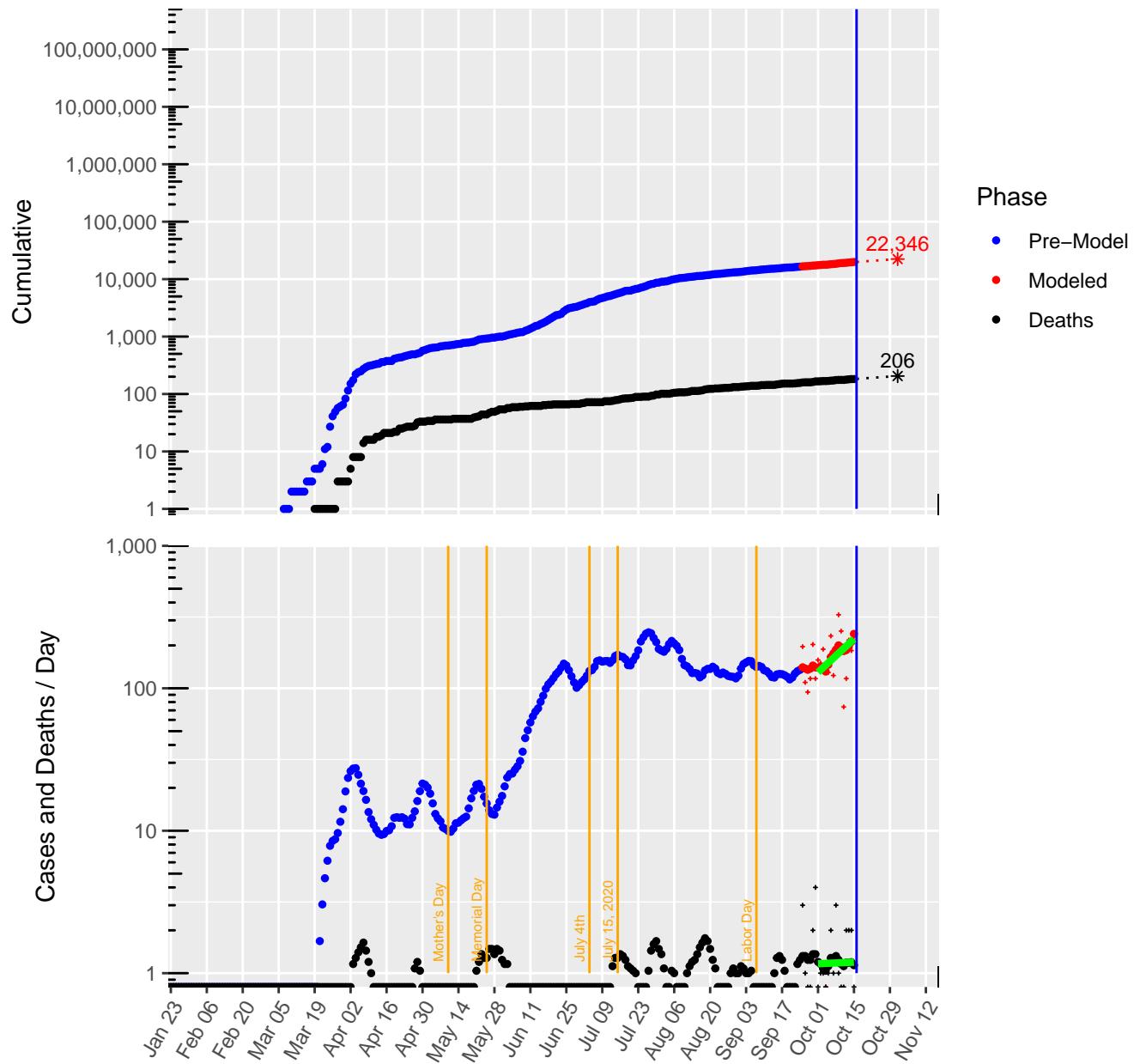


88 (87) — Deaths: 442 (0) — Case Mortality: 1.4% — Daily Change: +3.1% Cases, -4.2% Deaths

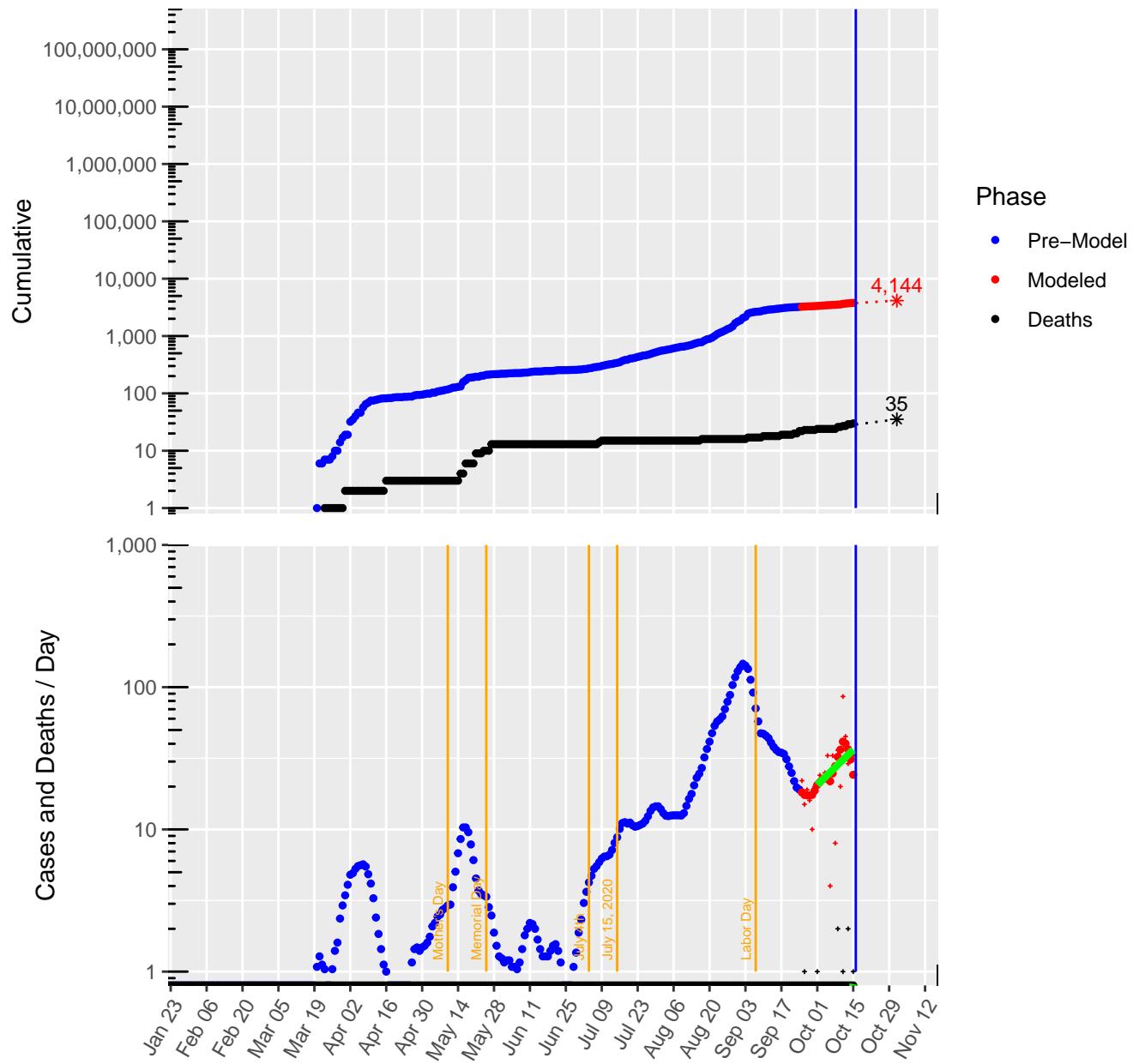
# El Paso County, Texas projection as of 2020-10-16



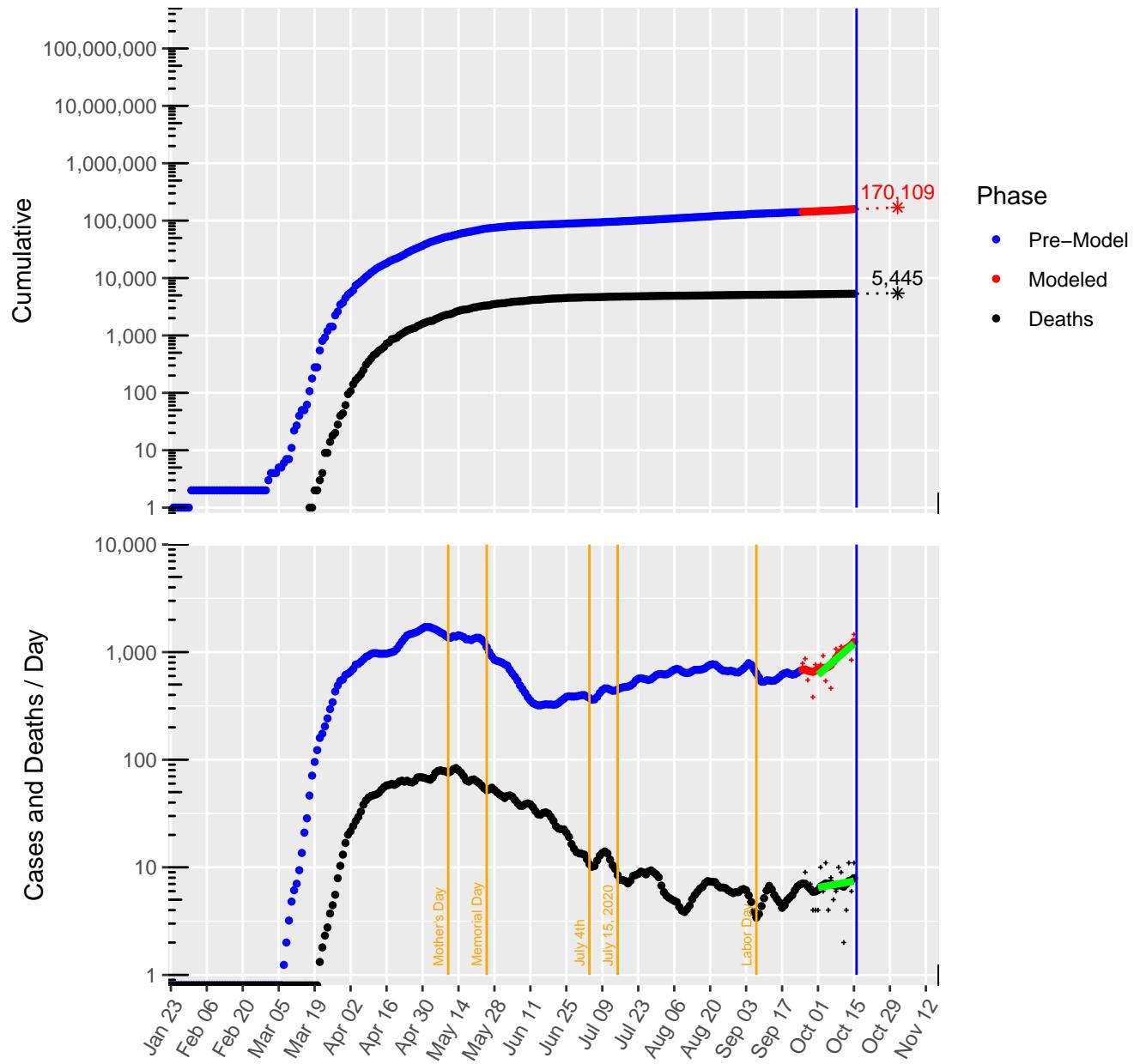
# Tulsa County, Oklahoma projection as of 2020-10-16



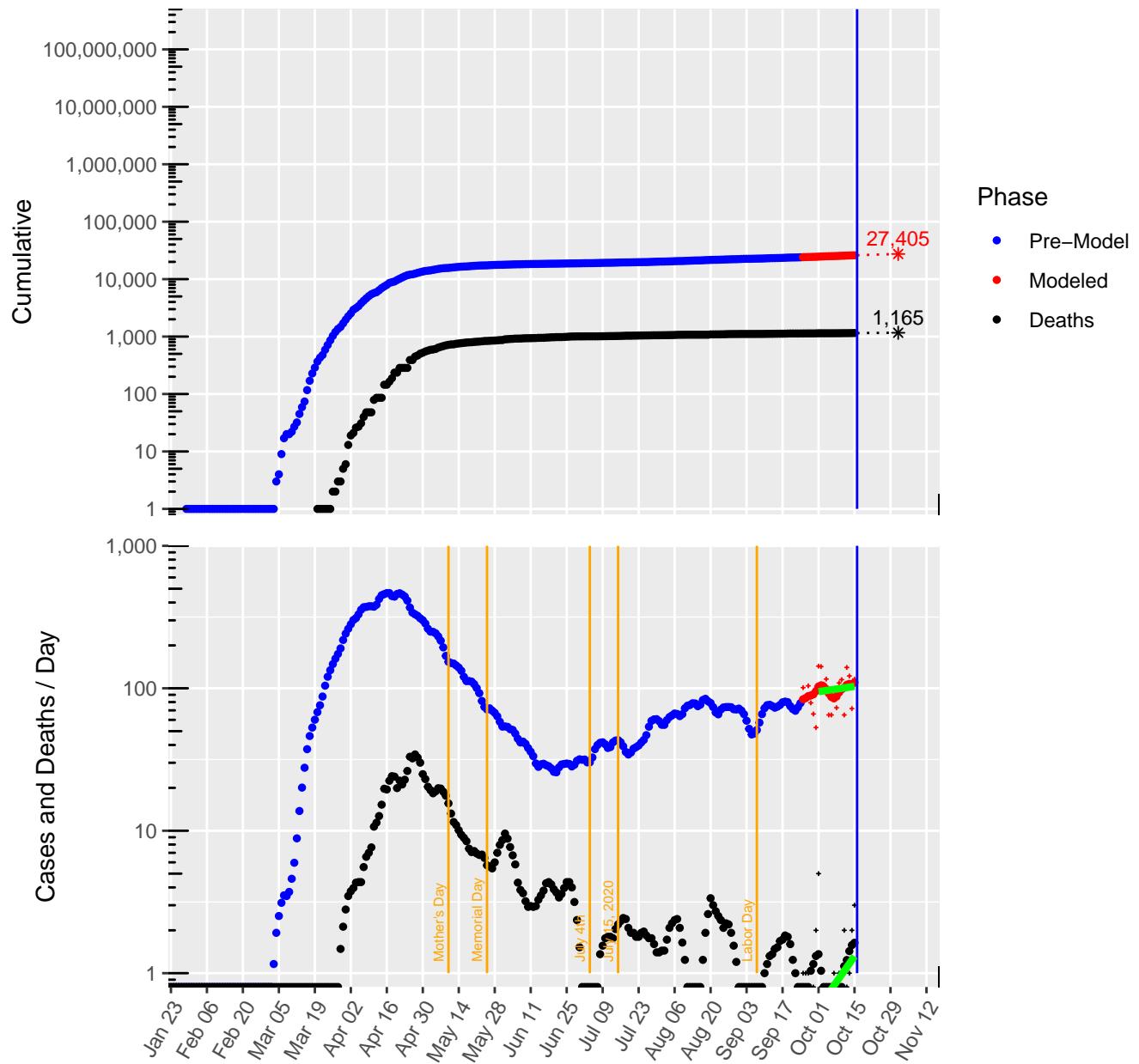
# McLean County, Illinois projection as of 2020-10-16



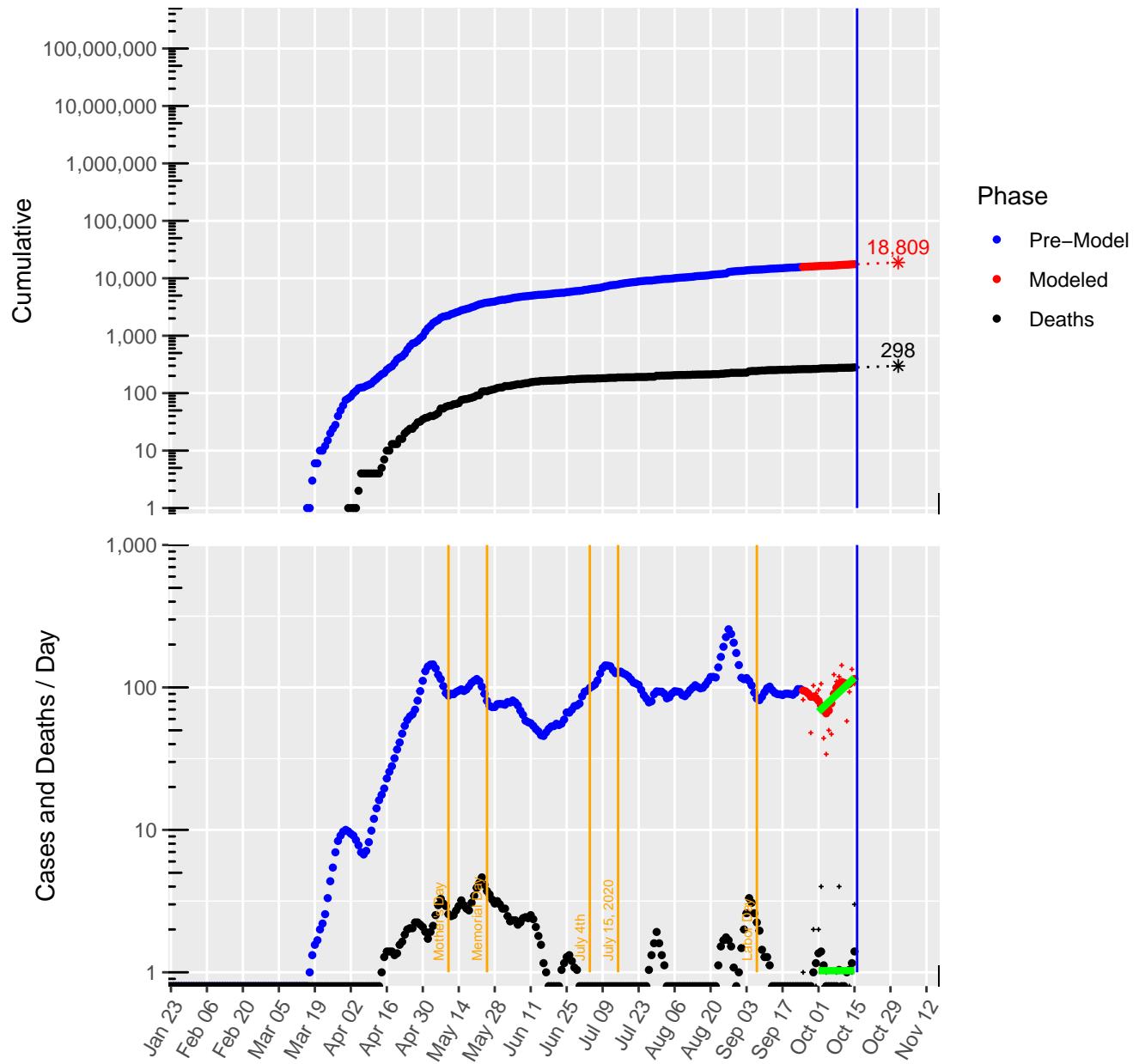
# Cook County, Illinois projection as of 2020-10-16



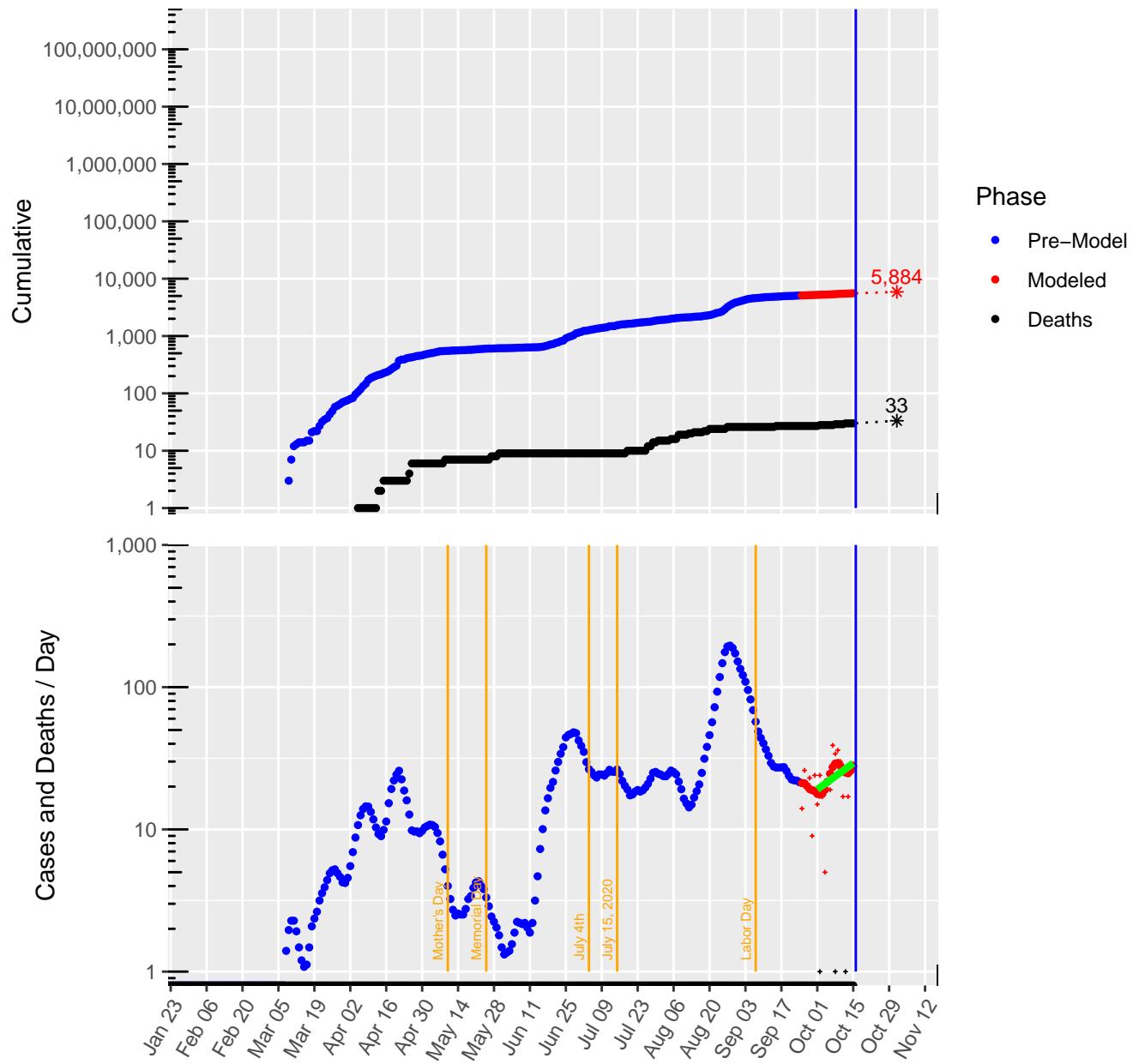
# Suffolk County (Boston) projection as of 2020-10-16



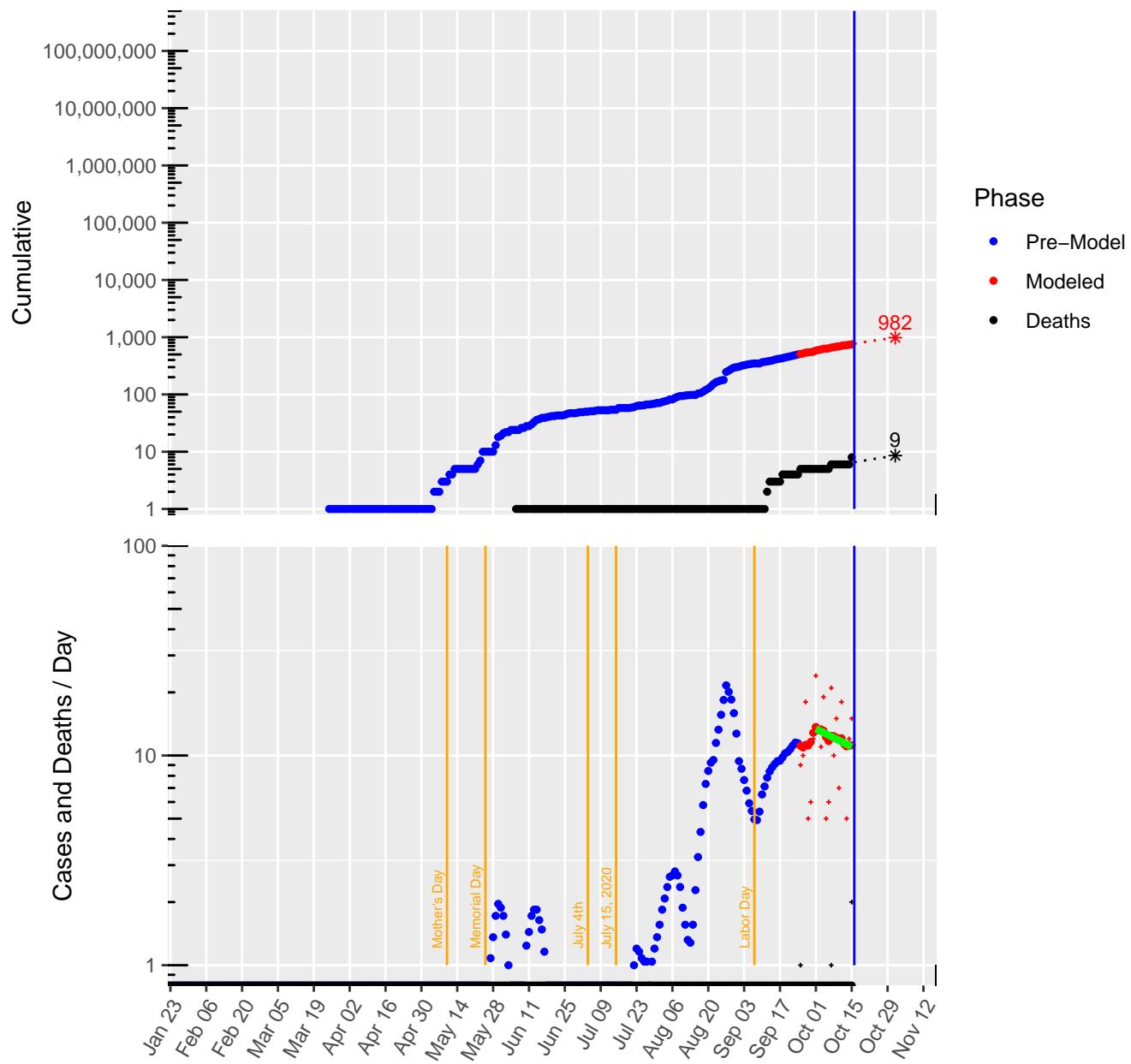
# Polk County, Iowa projection as of 2020-10-16



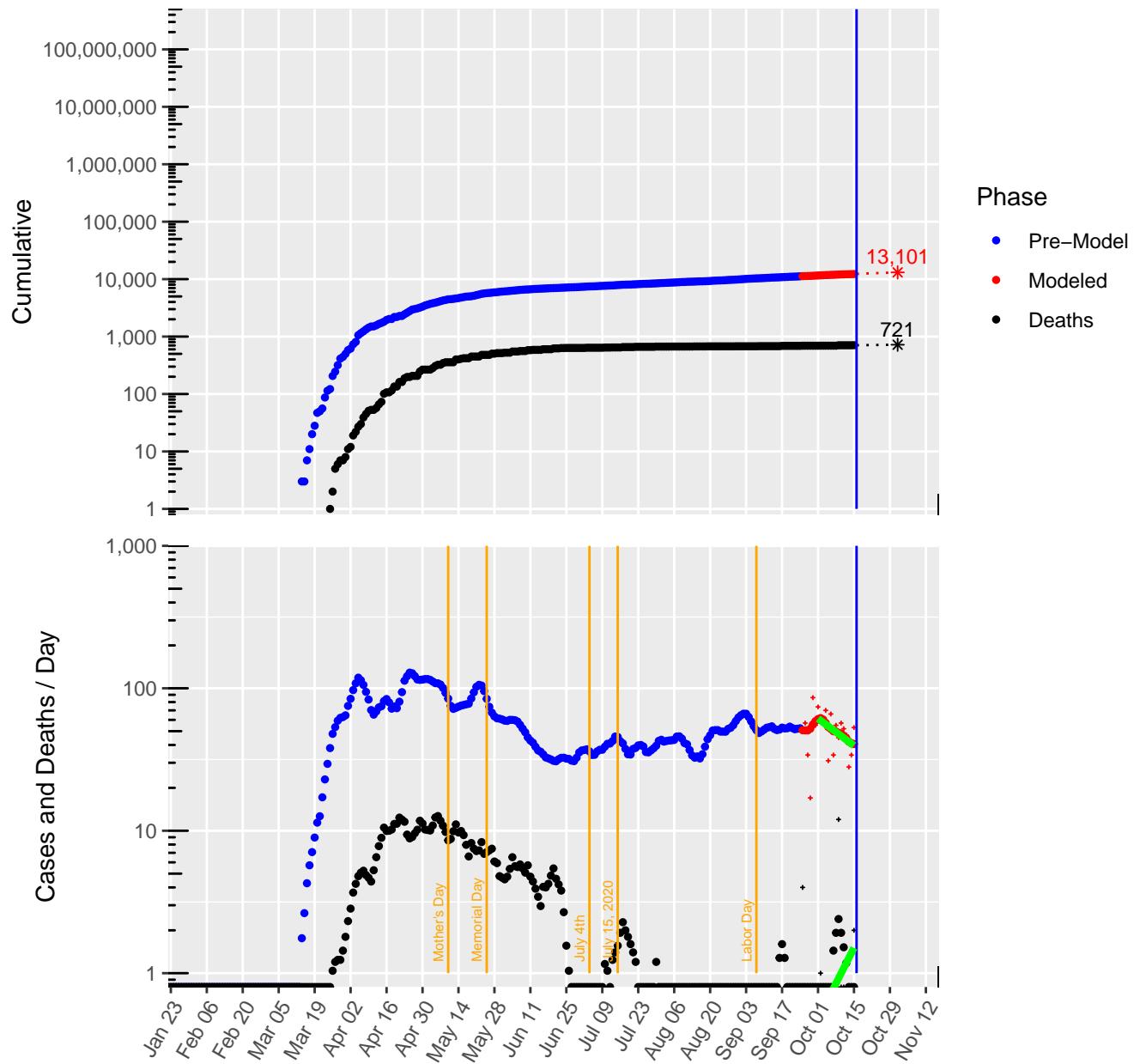
# Johnson County, Iowa projection as of 2020-10-16



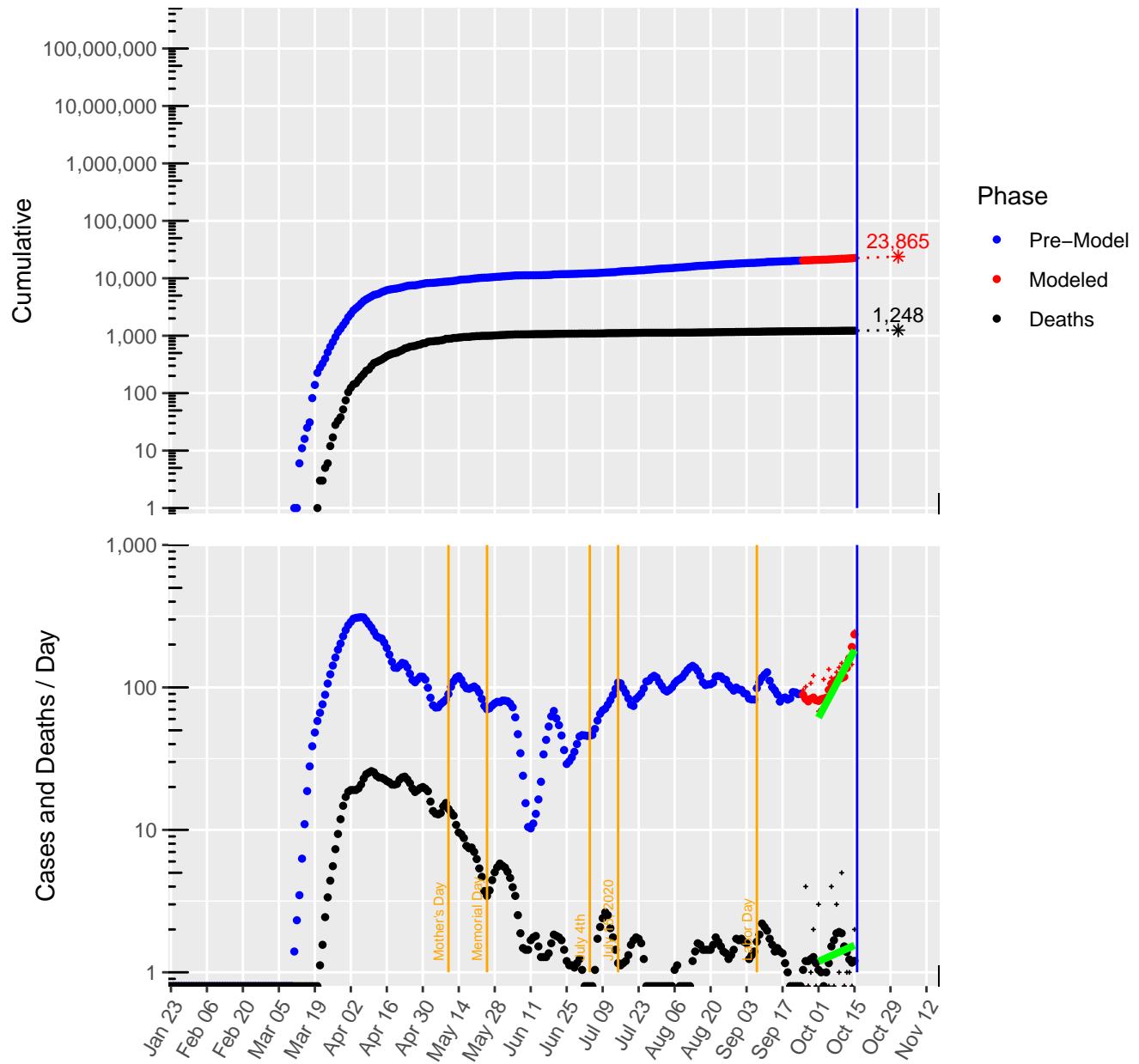
# Meade County, South Dakota (Sturgis) projection as of 2020-10-16



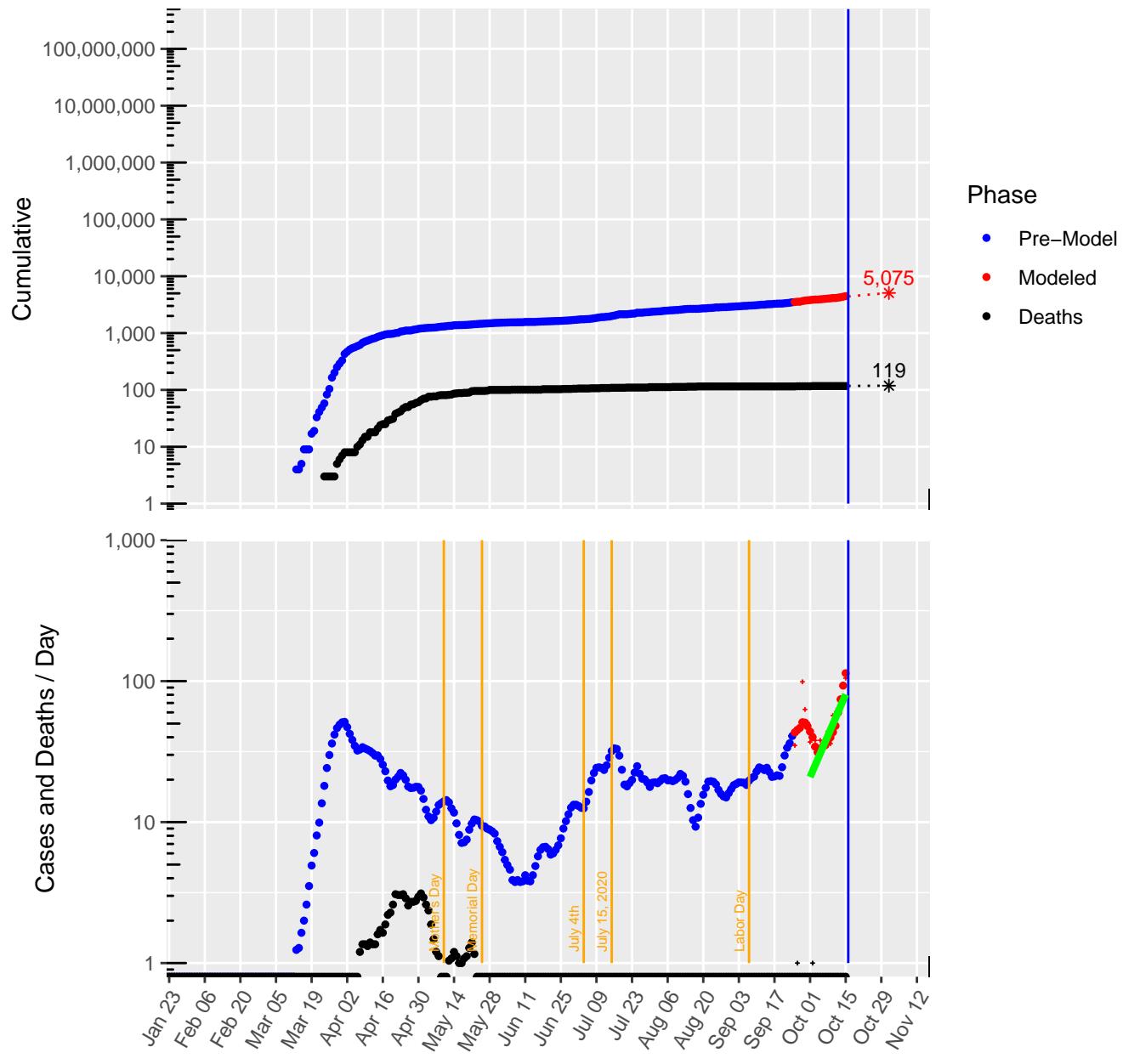
# Erie County, New York projection as of 2020-10-16



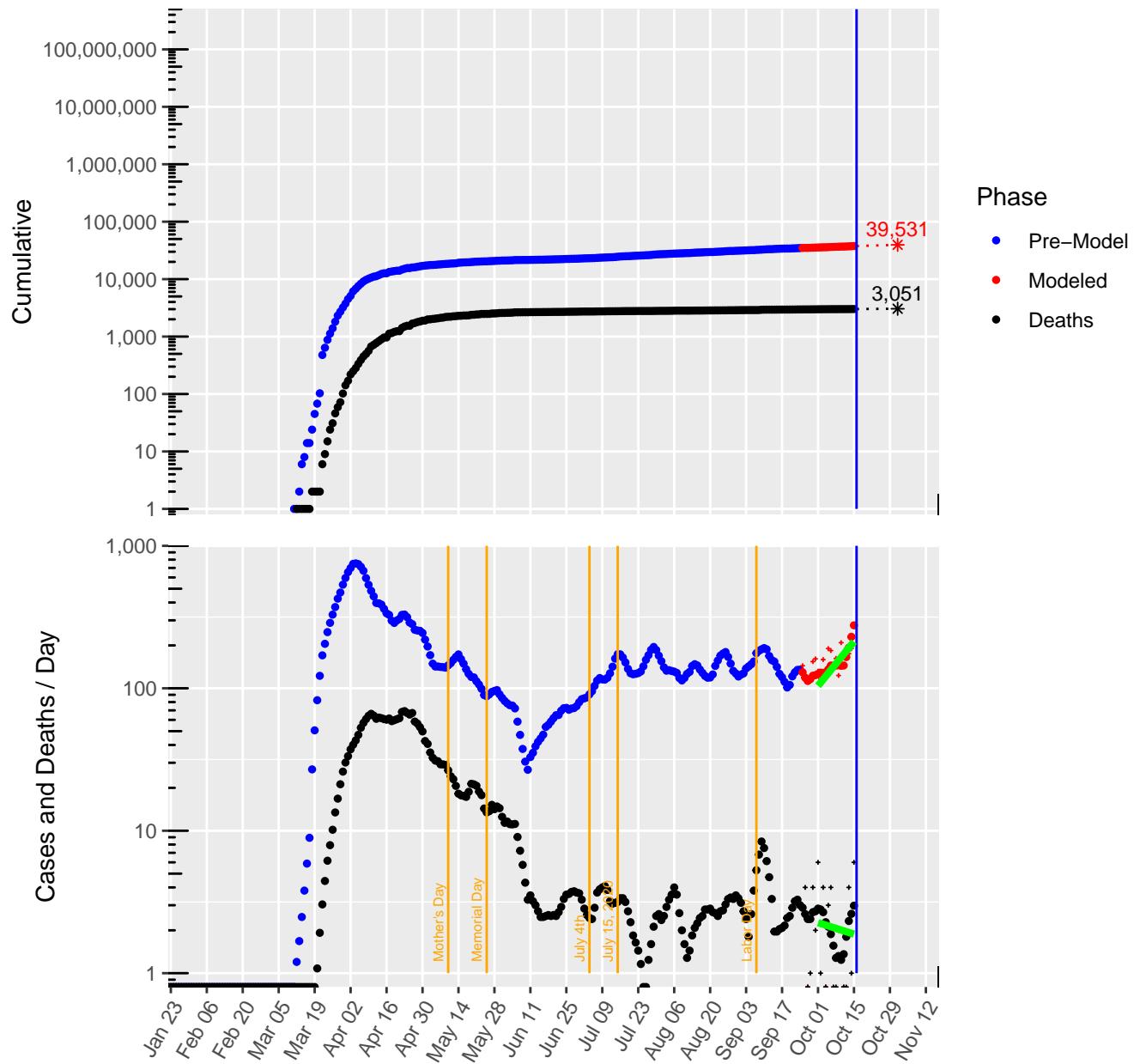
# Oakland County, Michigan projection as of 2020-10-16



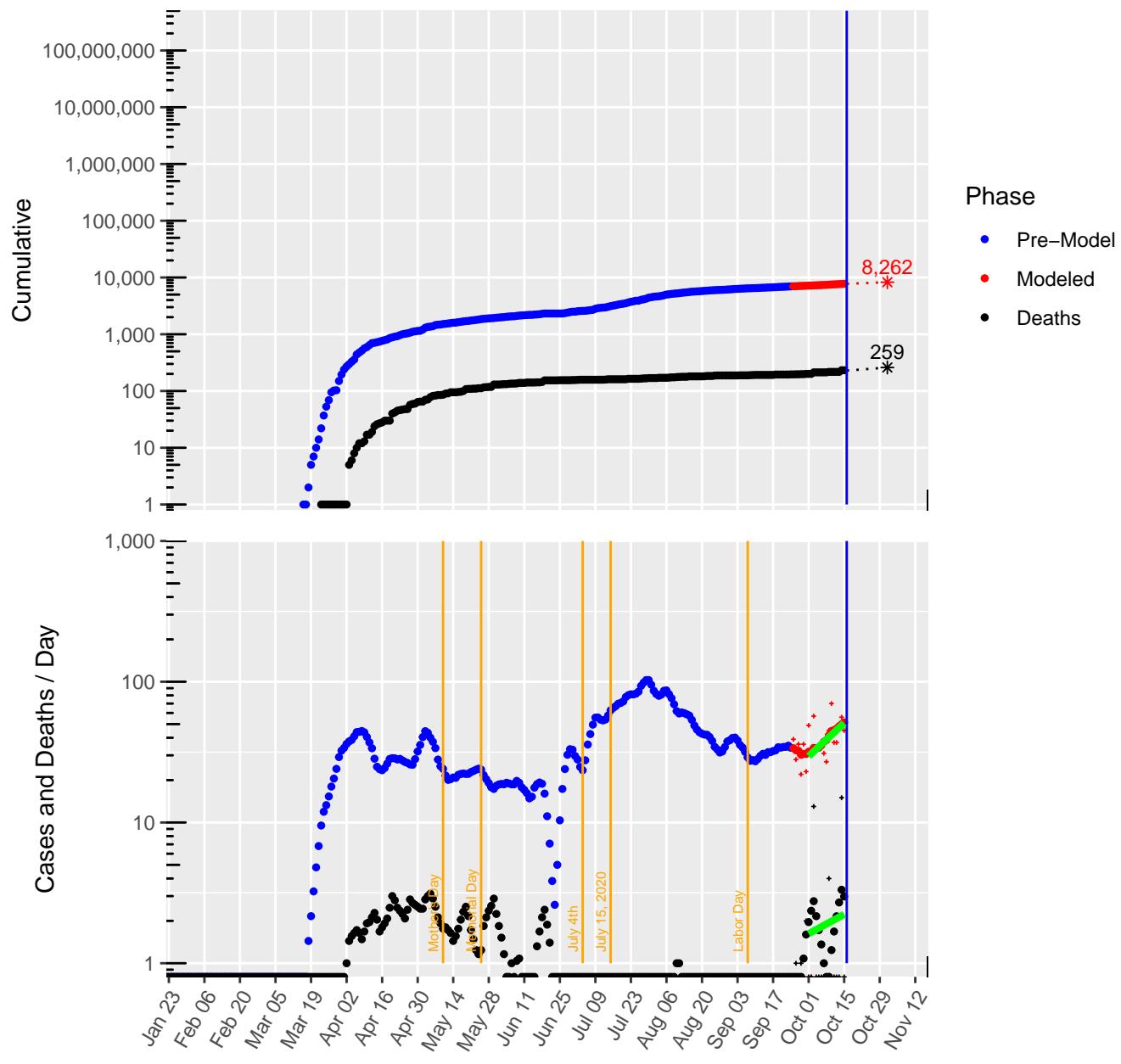
# Washtenaw County, Michigan (Ann Arbor) projection as of 2020-10-16



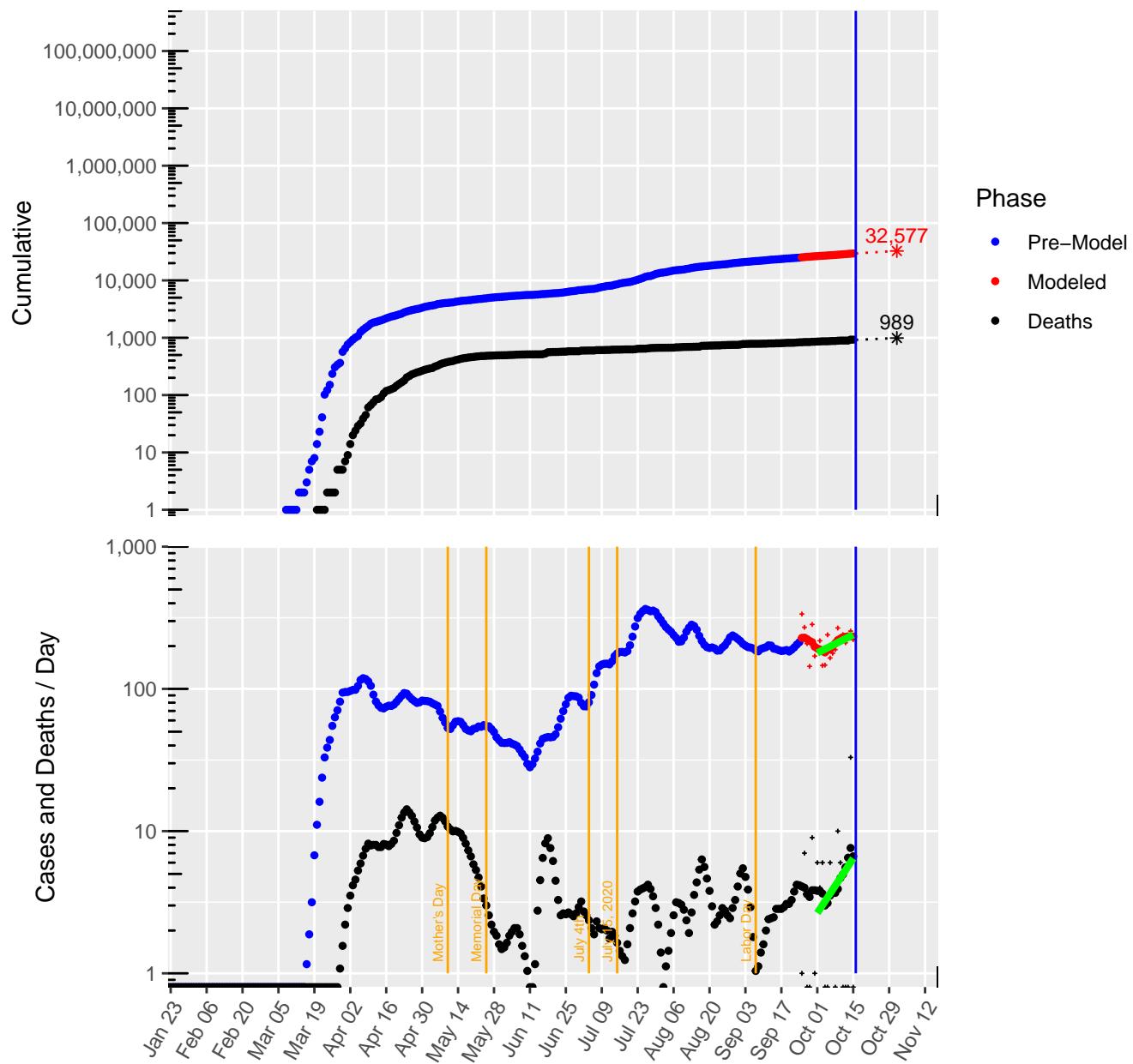
# Wayne County (Detroit) projection as of 2020-10-16



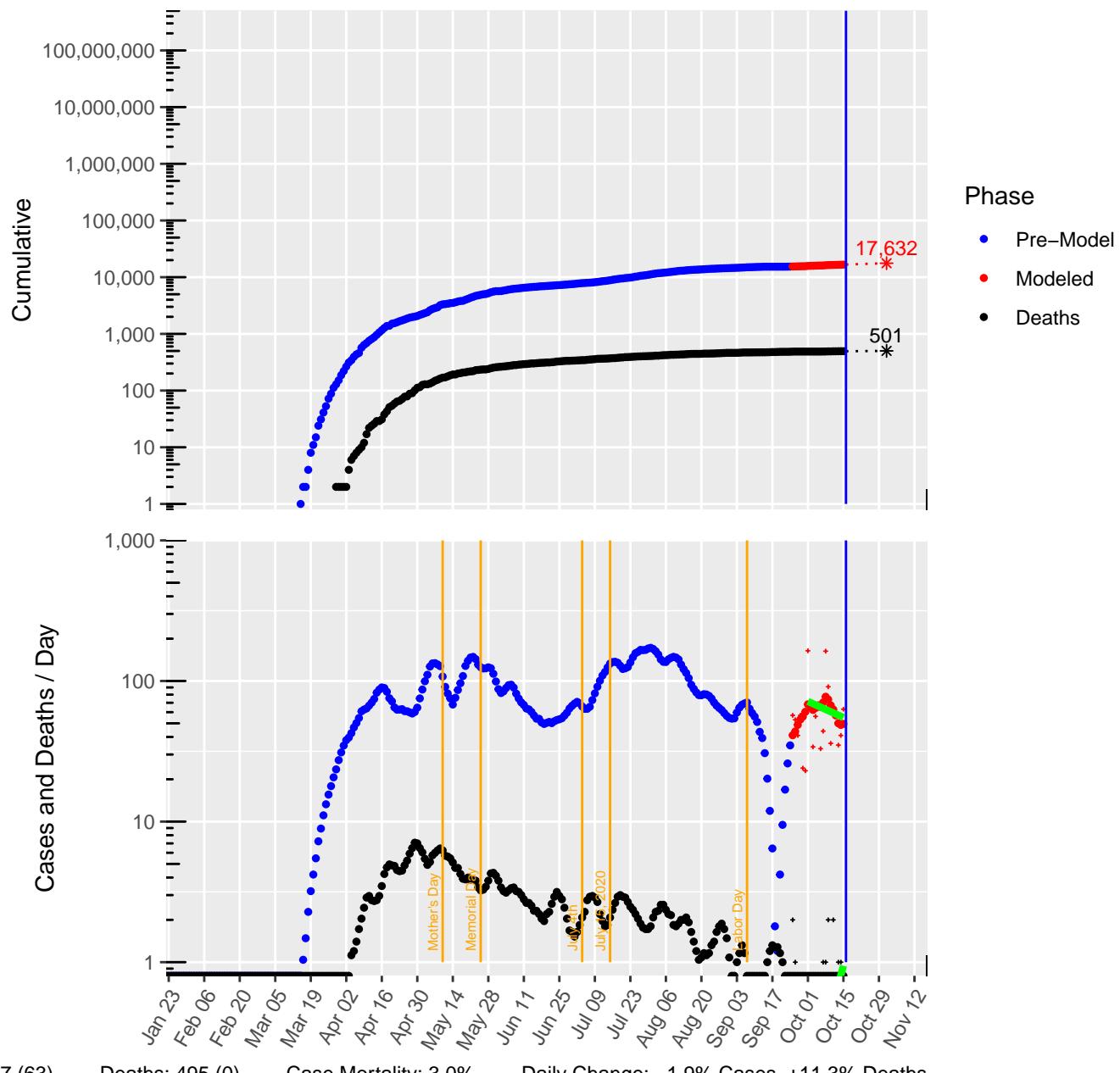
# St. Louis (City) projection as of 2020-10-16



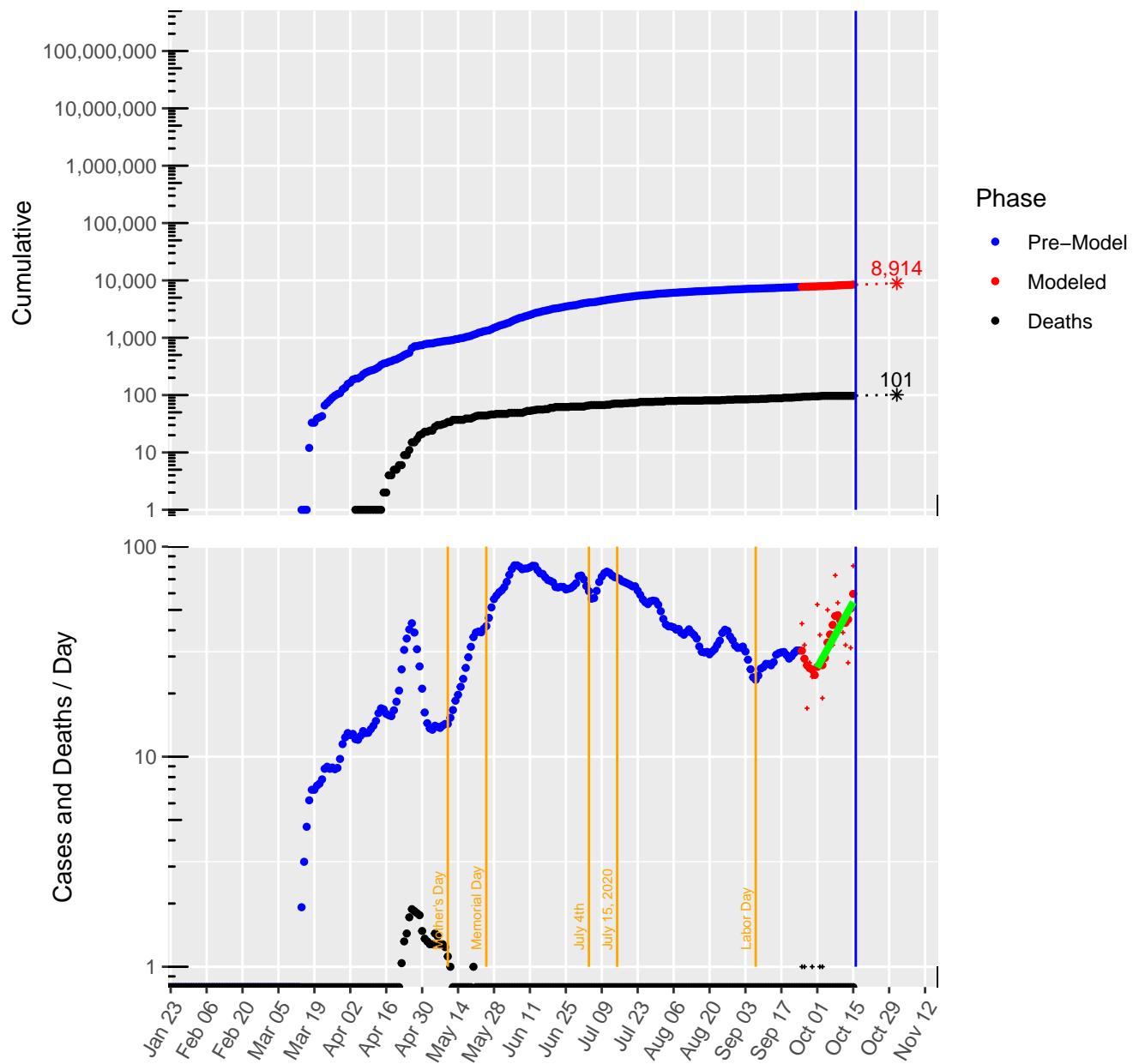
# St. Louis (County) projection as of 2020-10-16



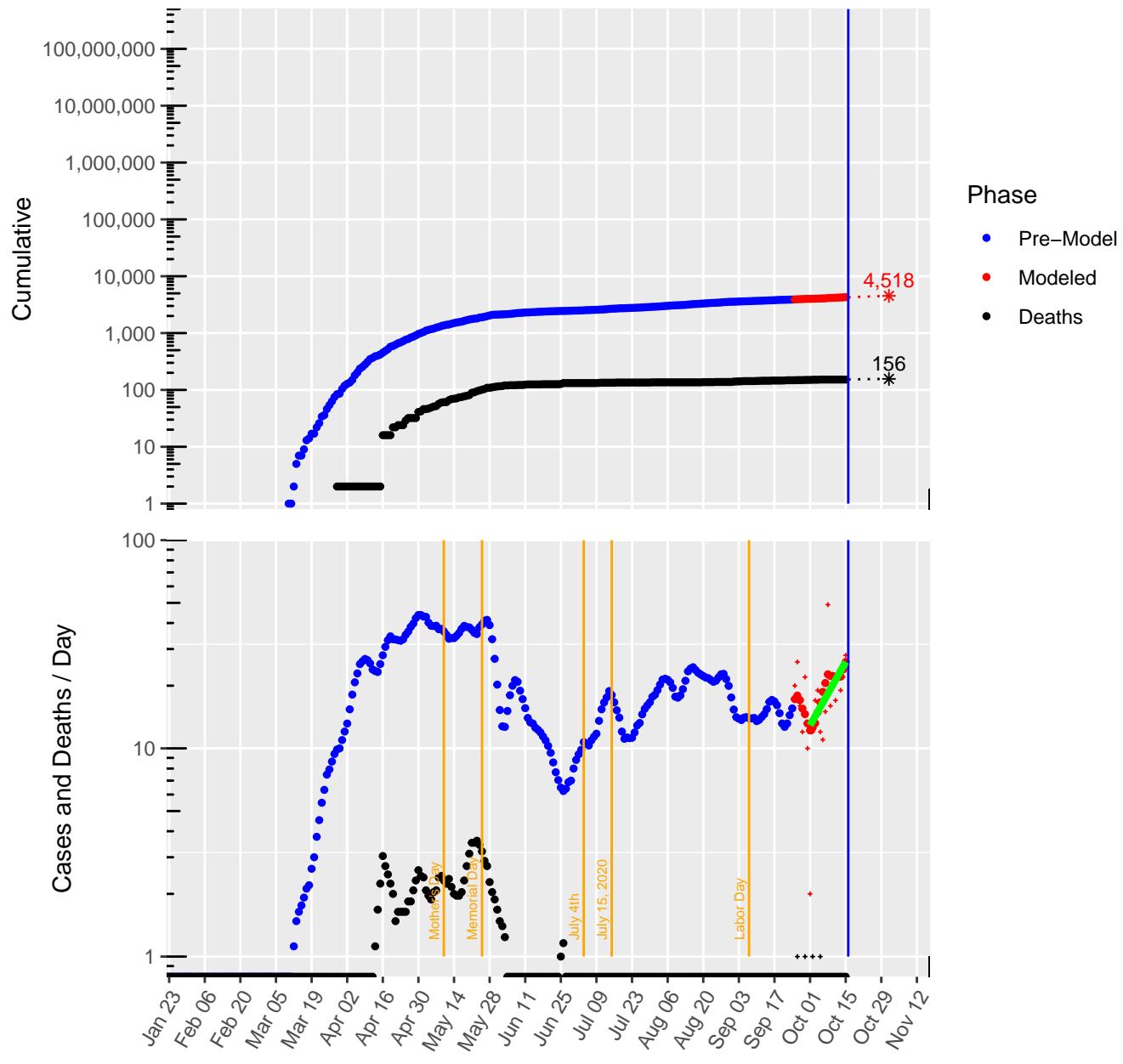
# Baltimore (City) projection as of 2020-10-16



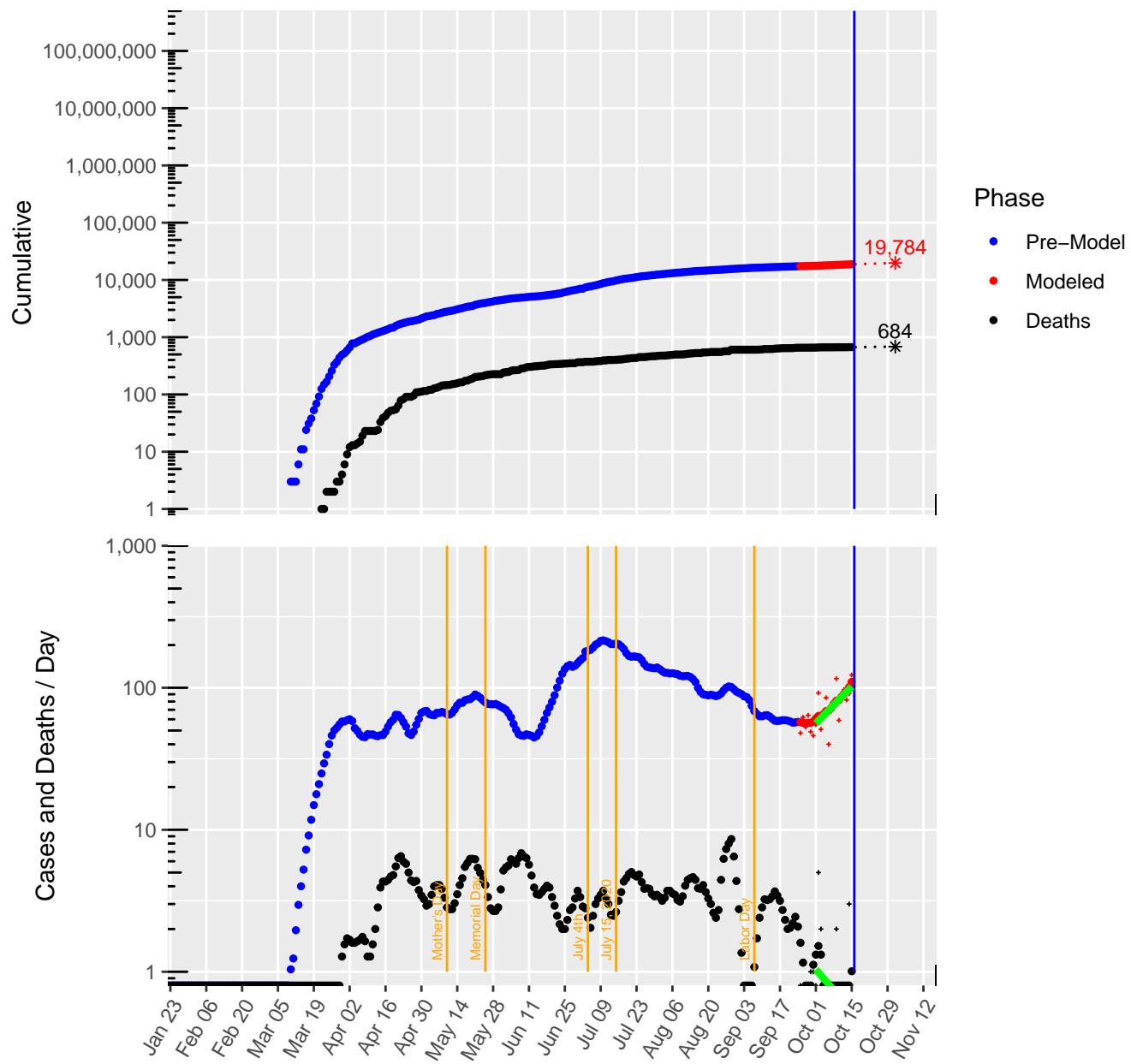
# Durham County, North Carolina projection as of 2020-10-16



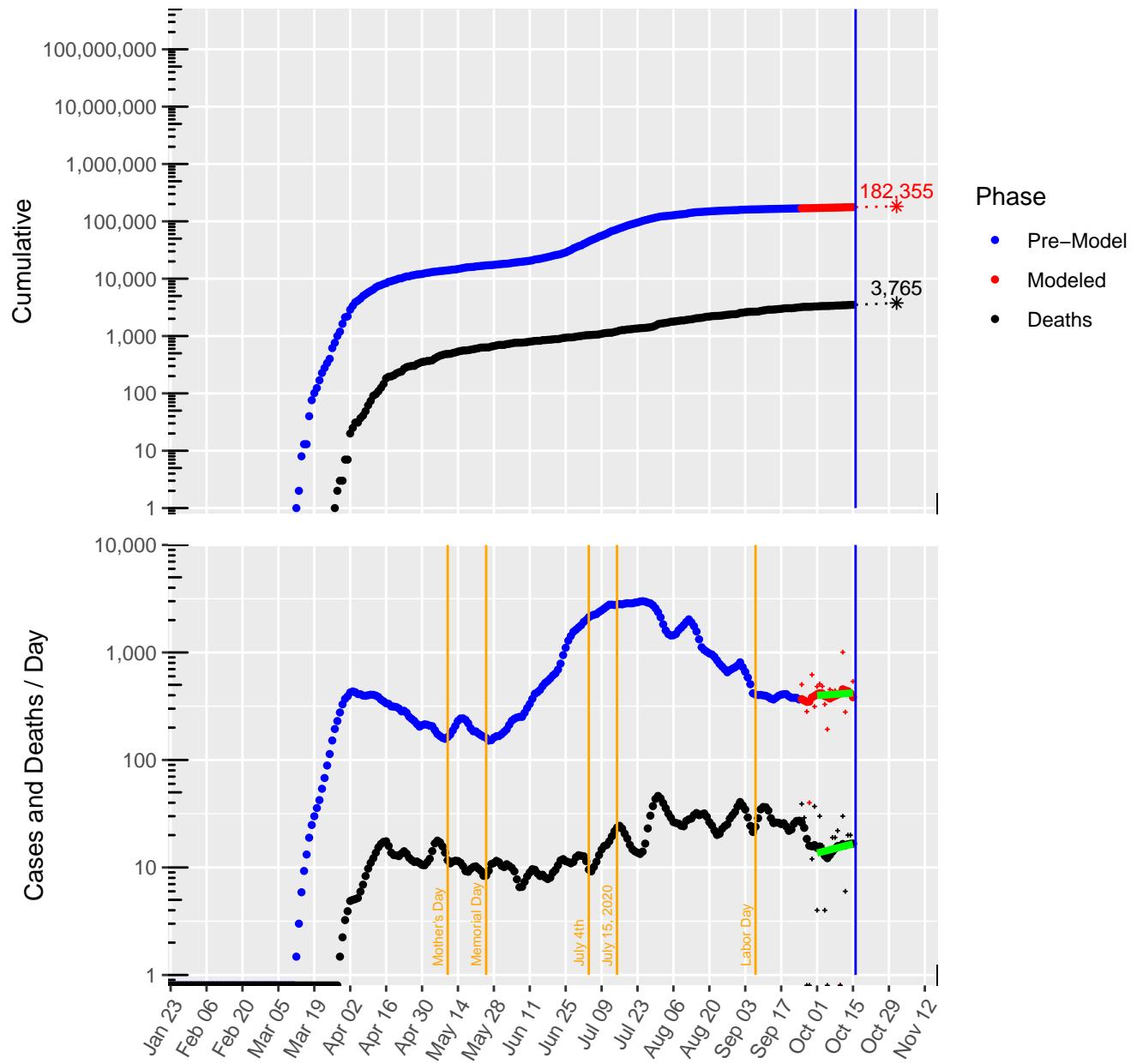
# Arlington County, Virginia projection as of 2020-10-16



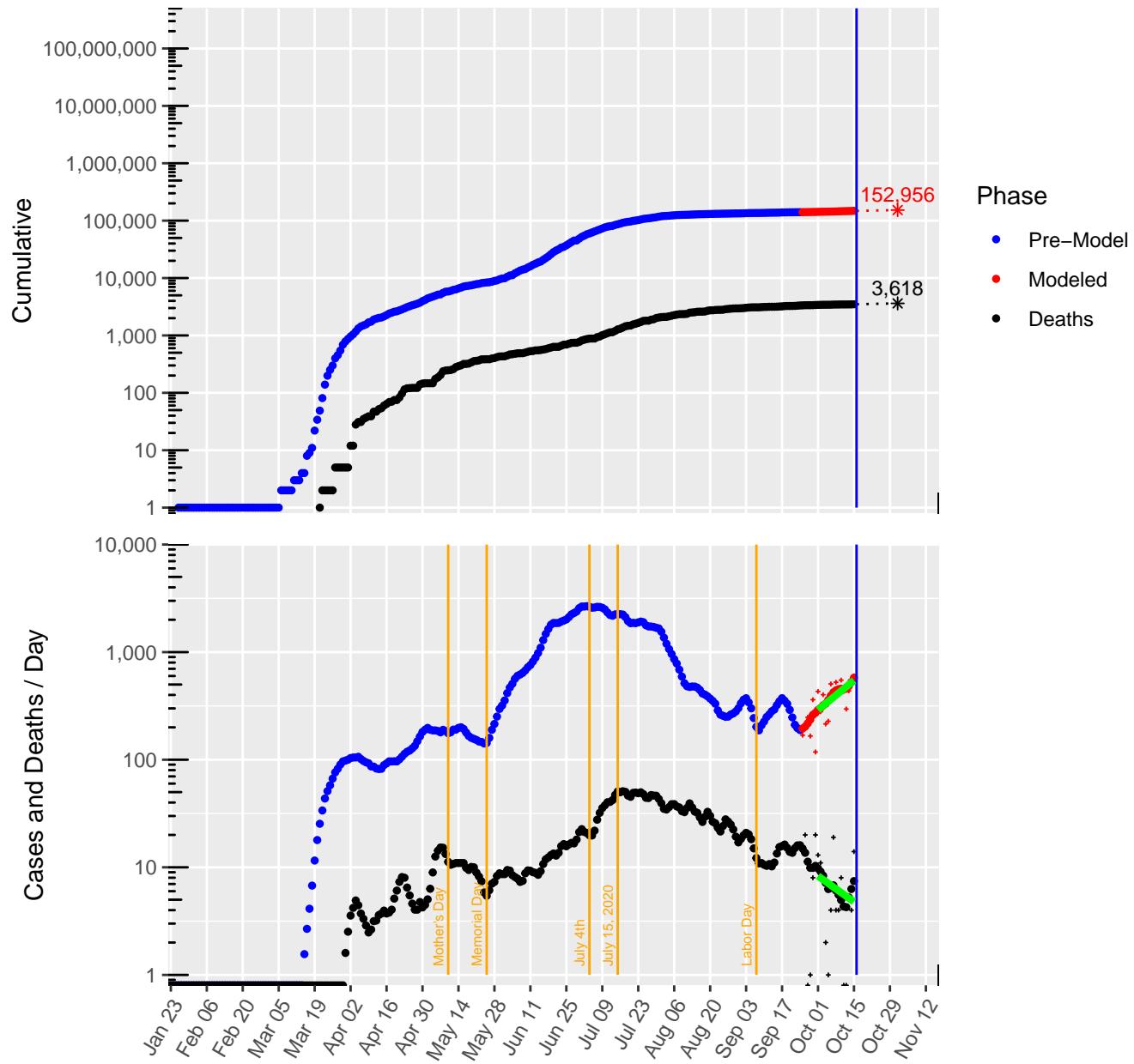
# Cuyahoga County (Cleveland) projection as of 2020-10-16



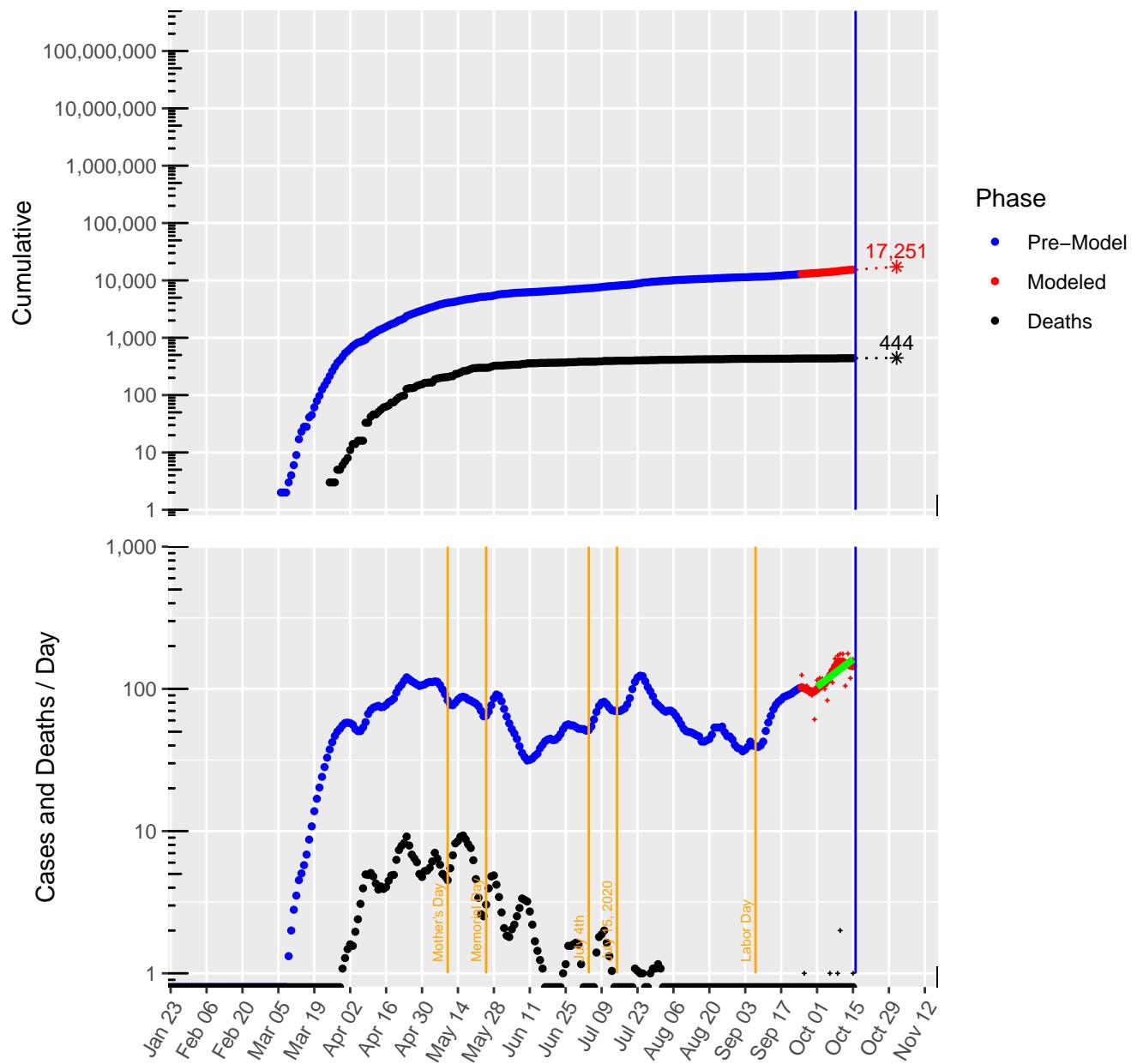
# Miami-Dade projection as of 2020-10-16



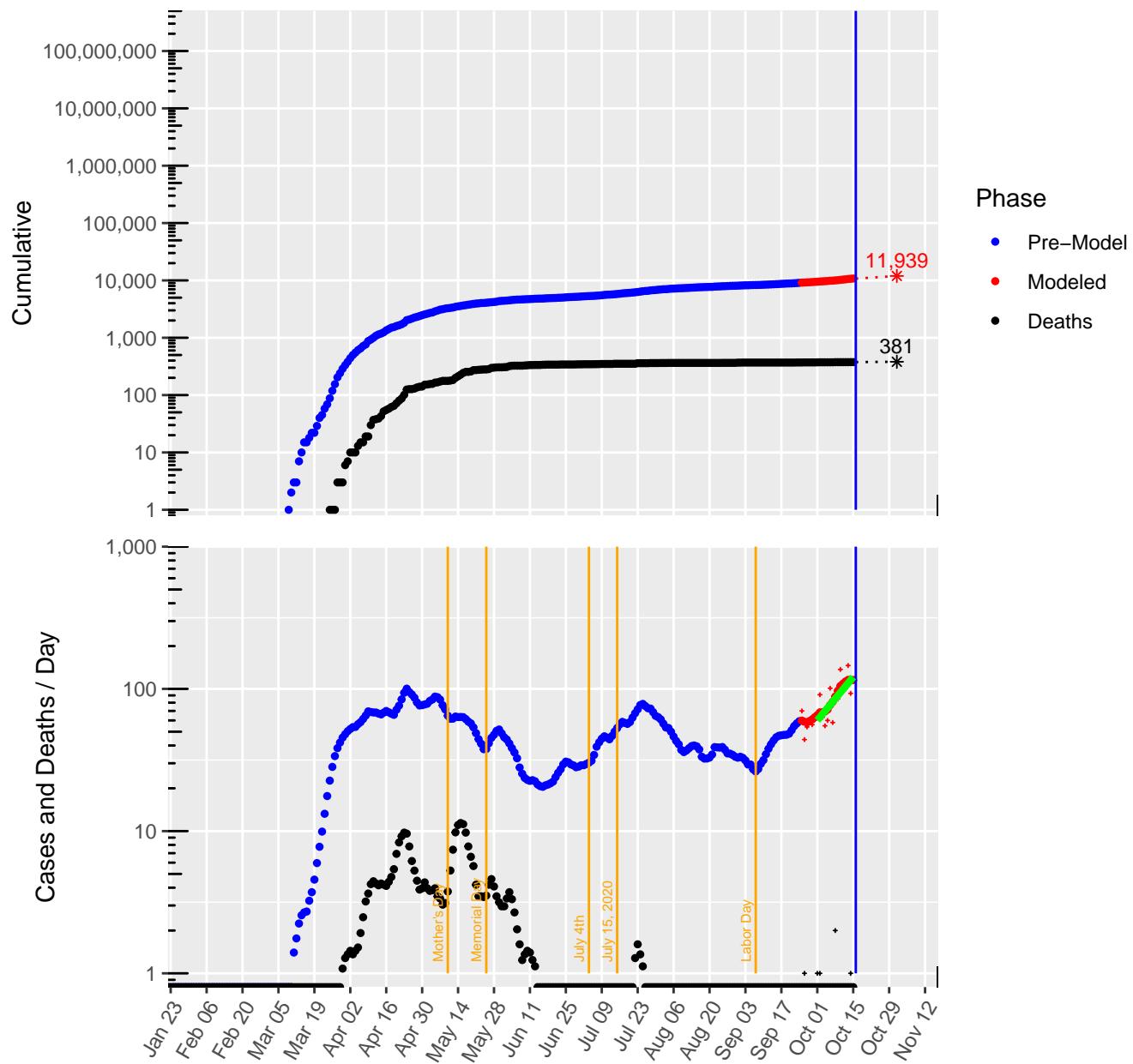
# Maricopa County, Arizona projection as of 2020-10-16



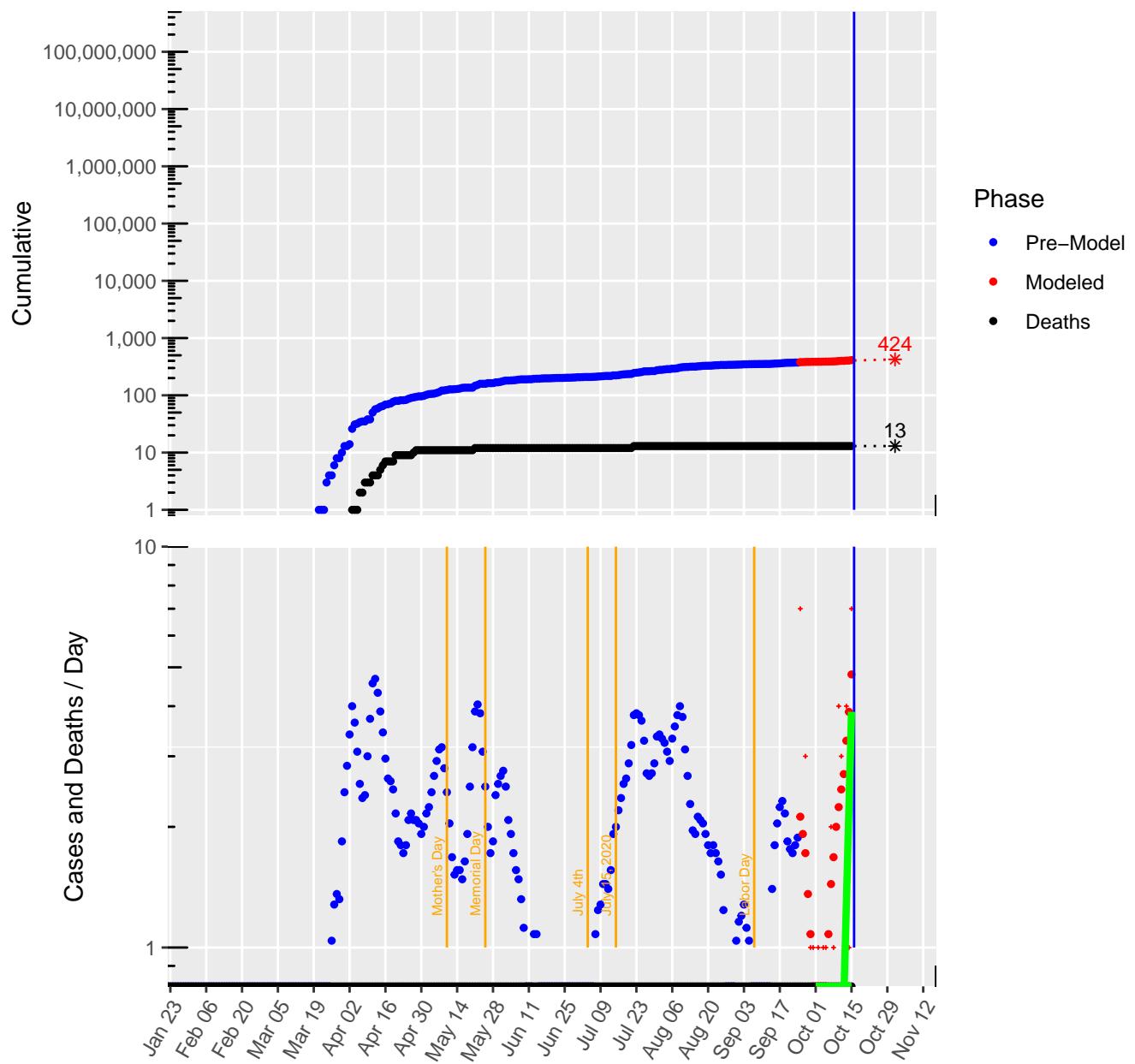
# Denver County projection as of 2020-10-16



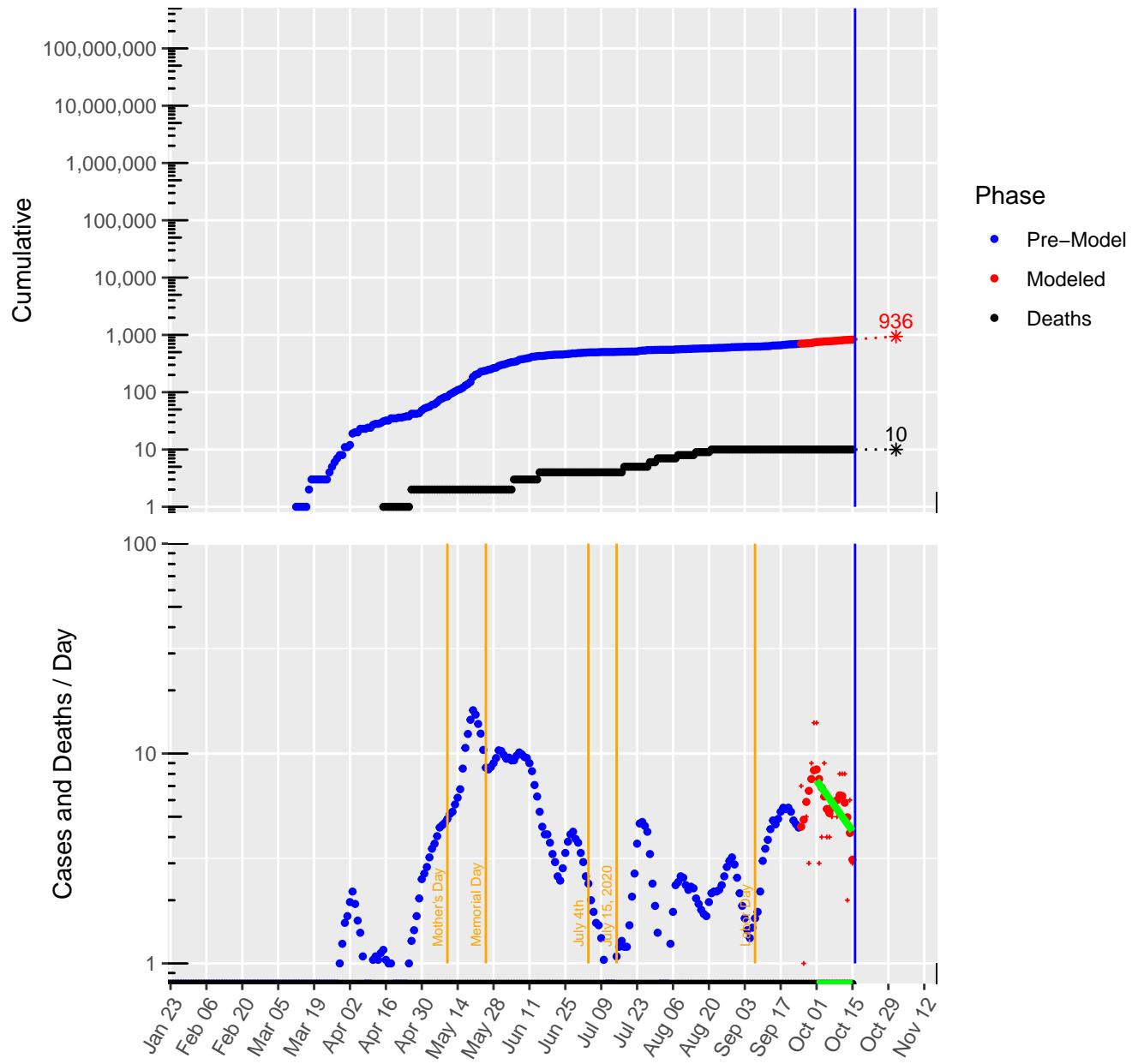
# Arapahoe County, Colorado projection as of 2020-10-16



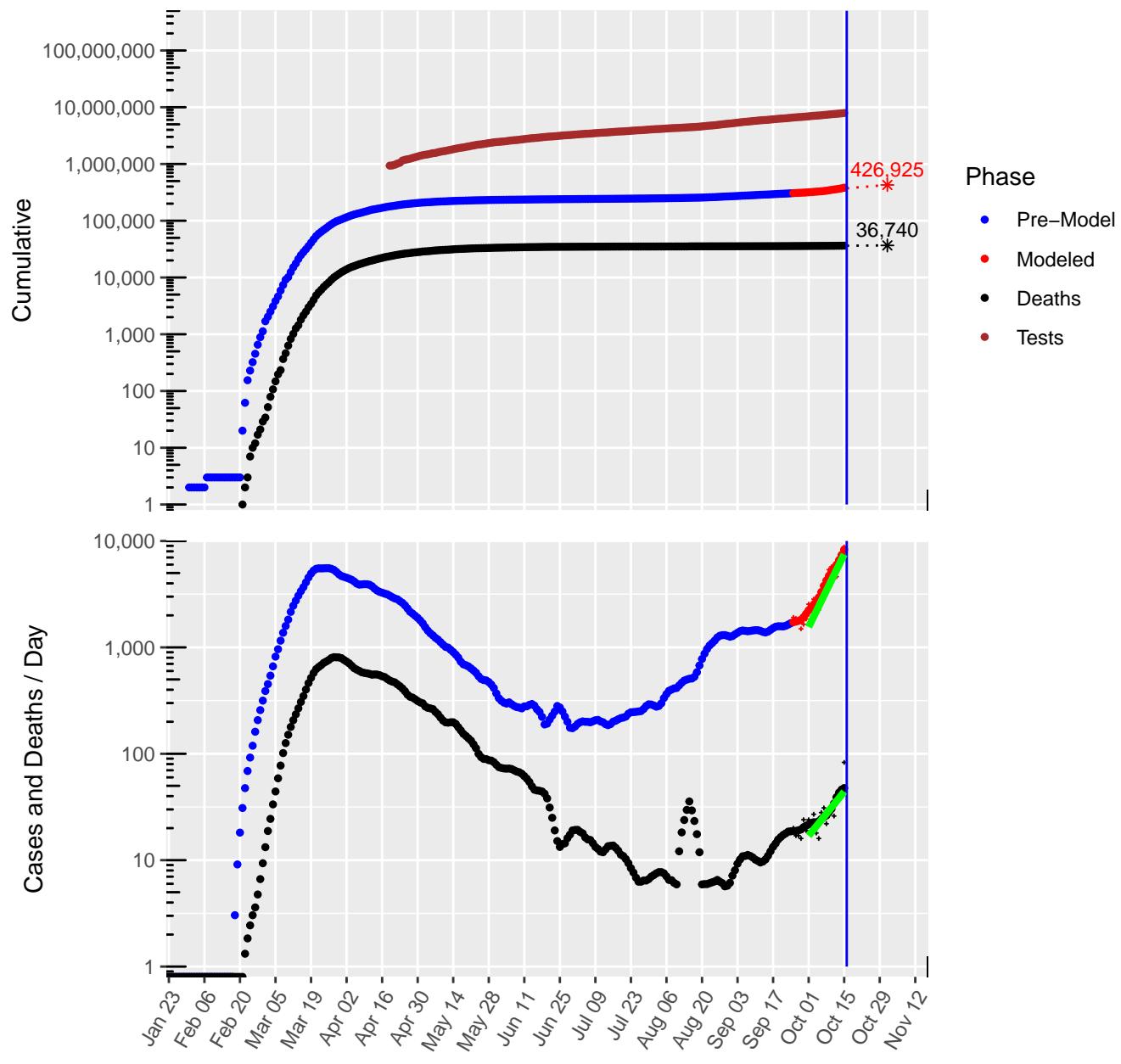
# Montrose County, Colorado projection as of 2020-10-16



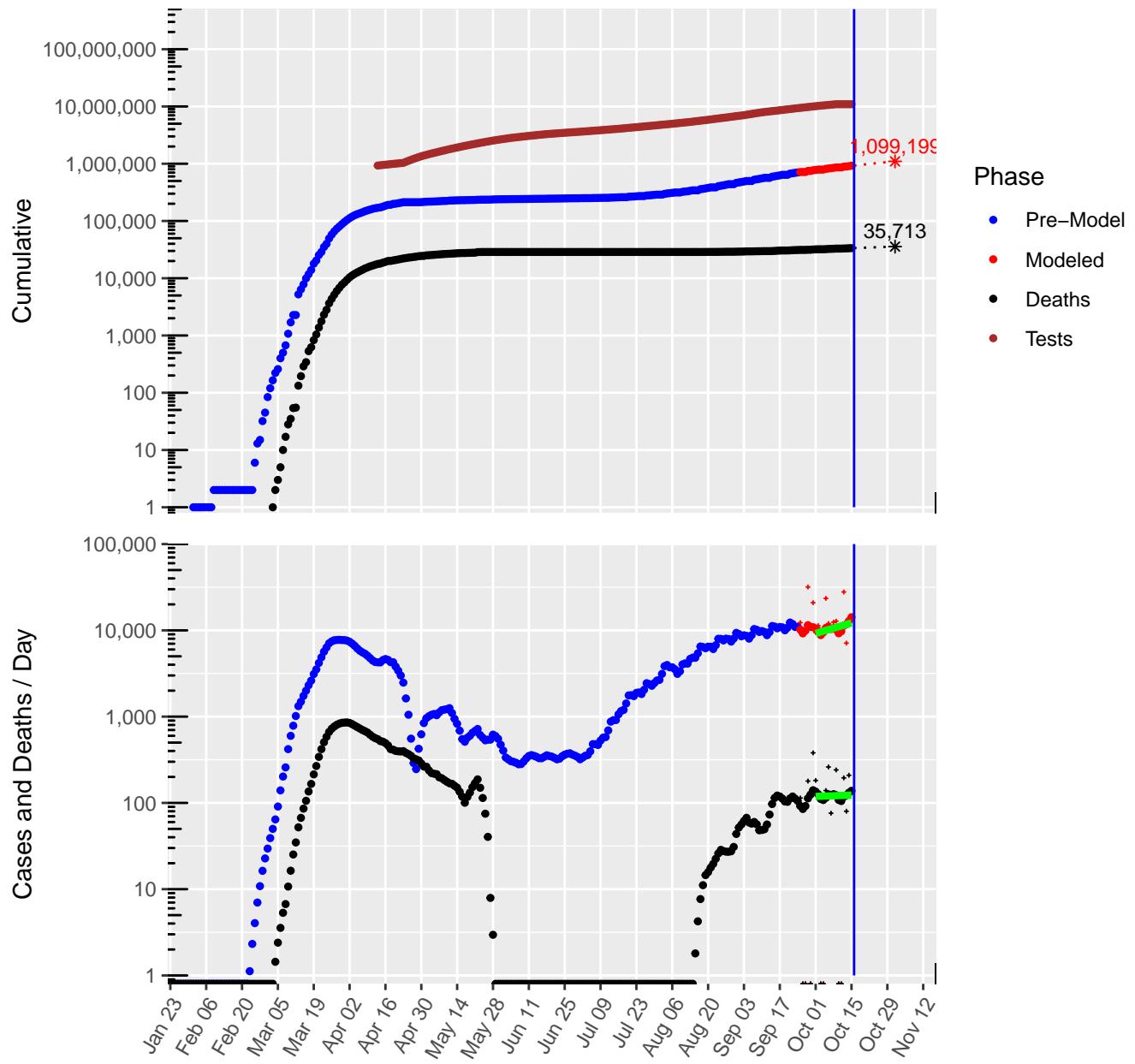
# Androscoggin County, Maine projection as of 2020-10-16



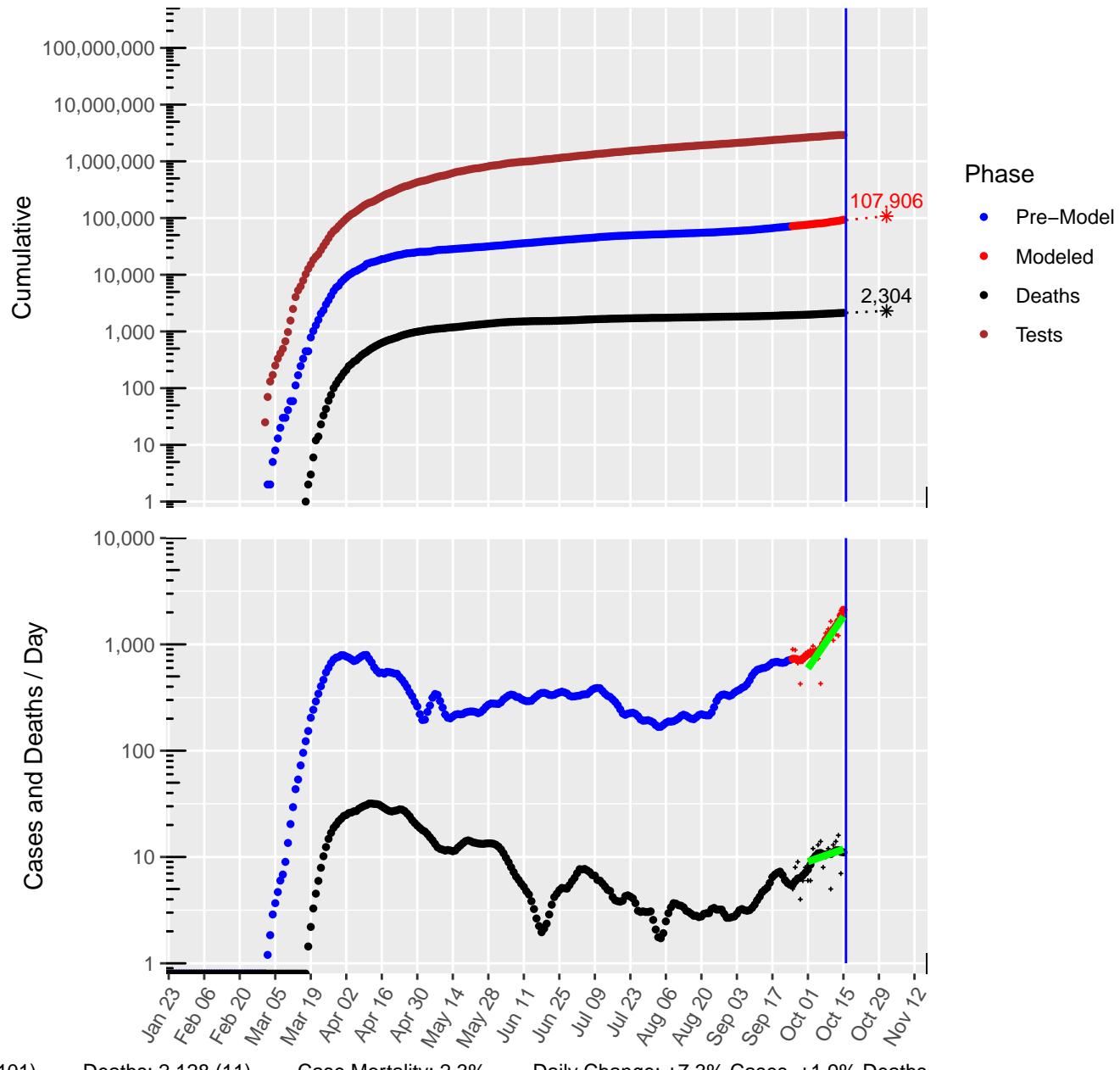
# Italy projection as of 2020-10-16



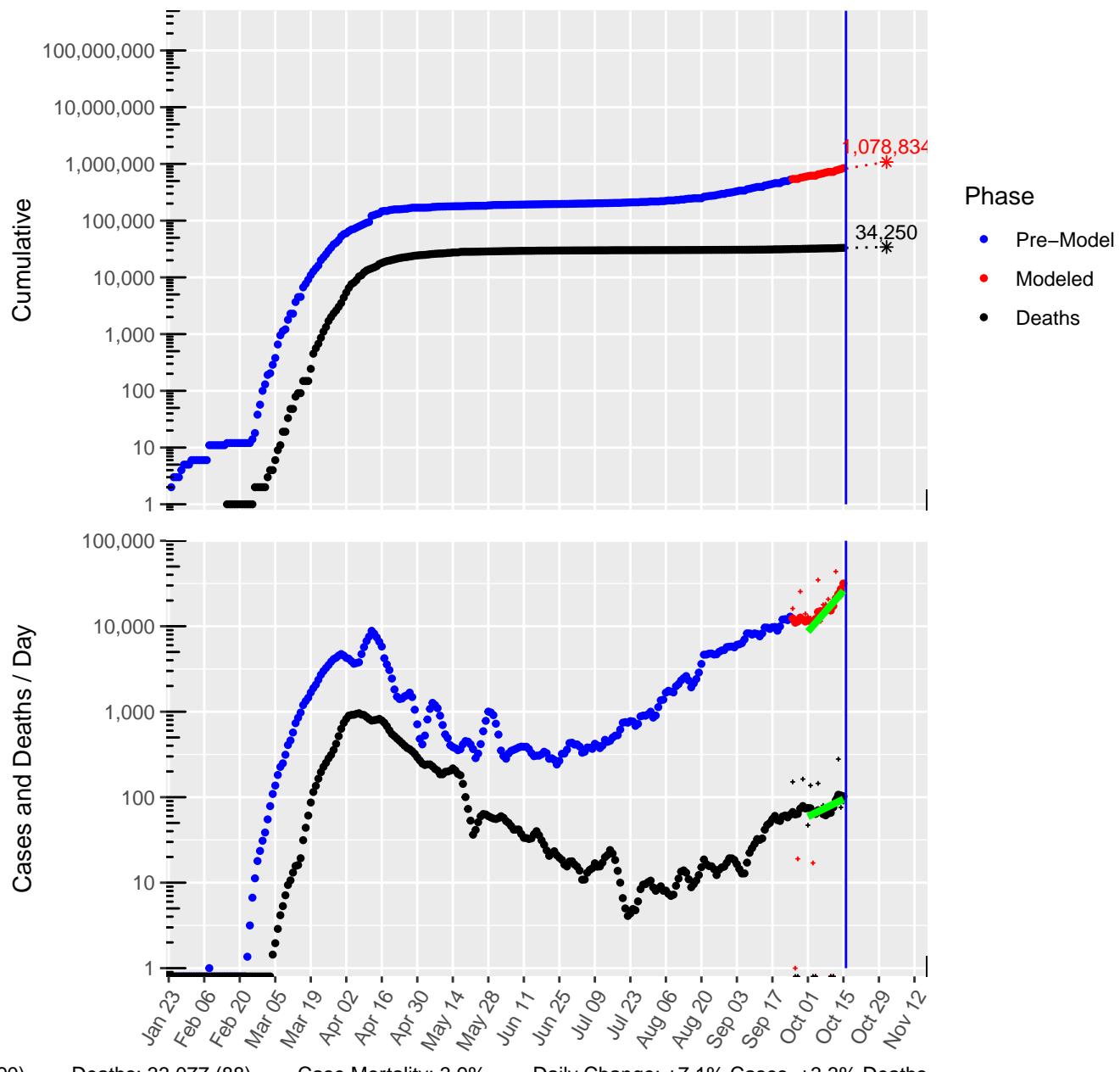
# Spain projection as of 2020-10-16



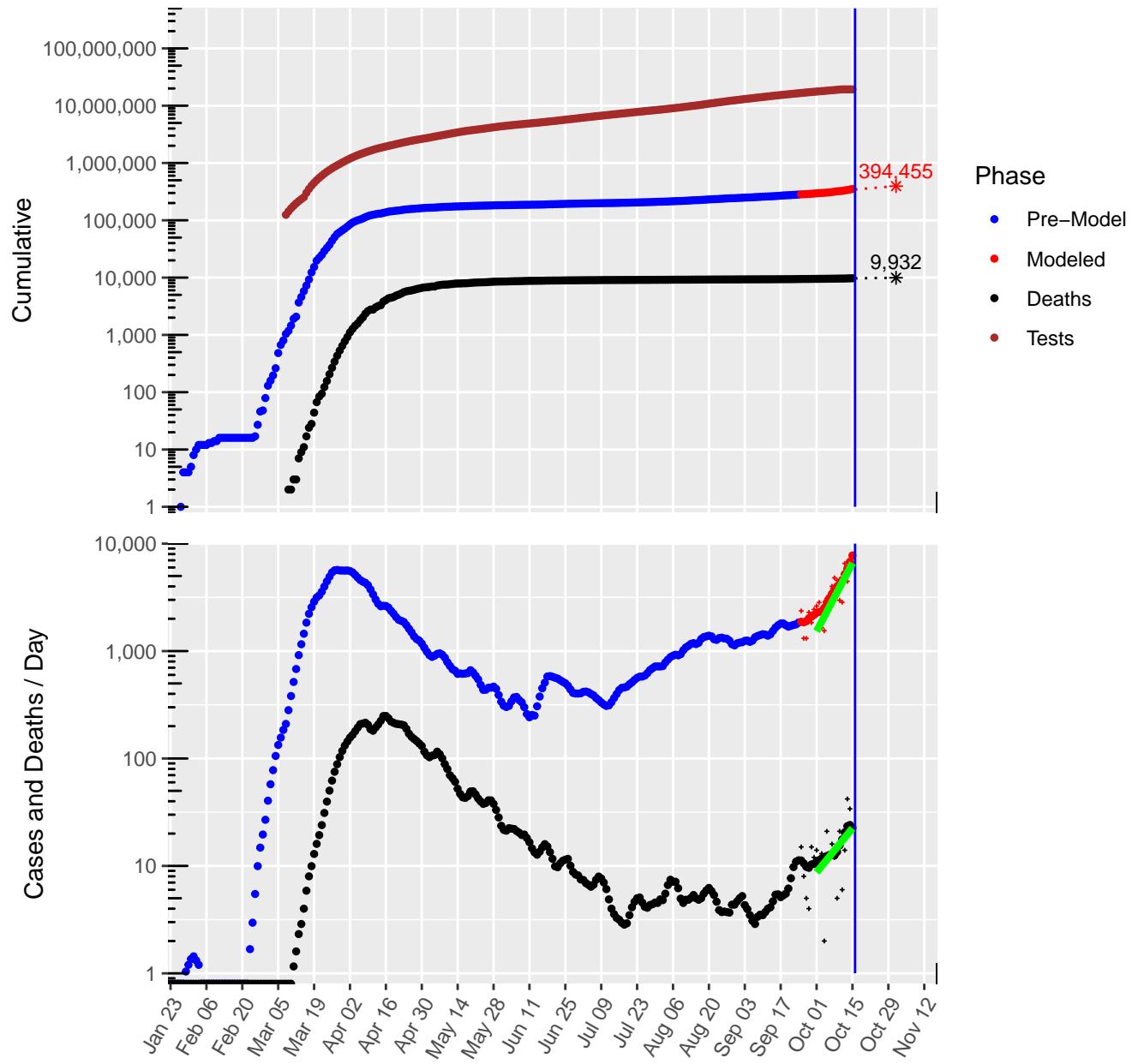
# Portugal projection as of 2020-10-16



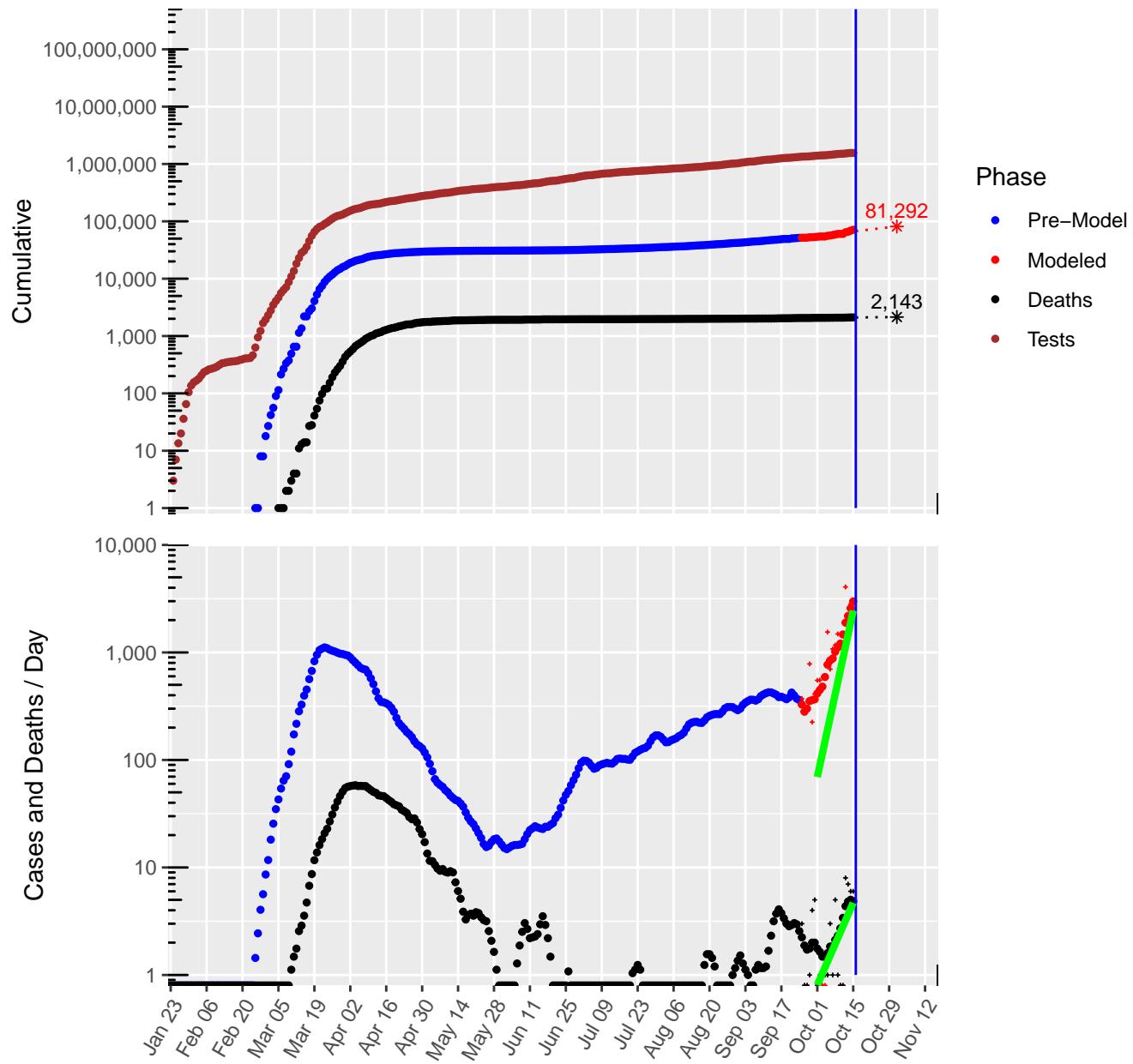
# France projection as of 2020-10-16



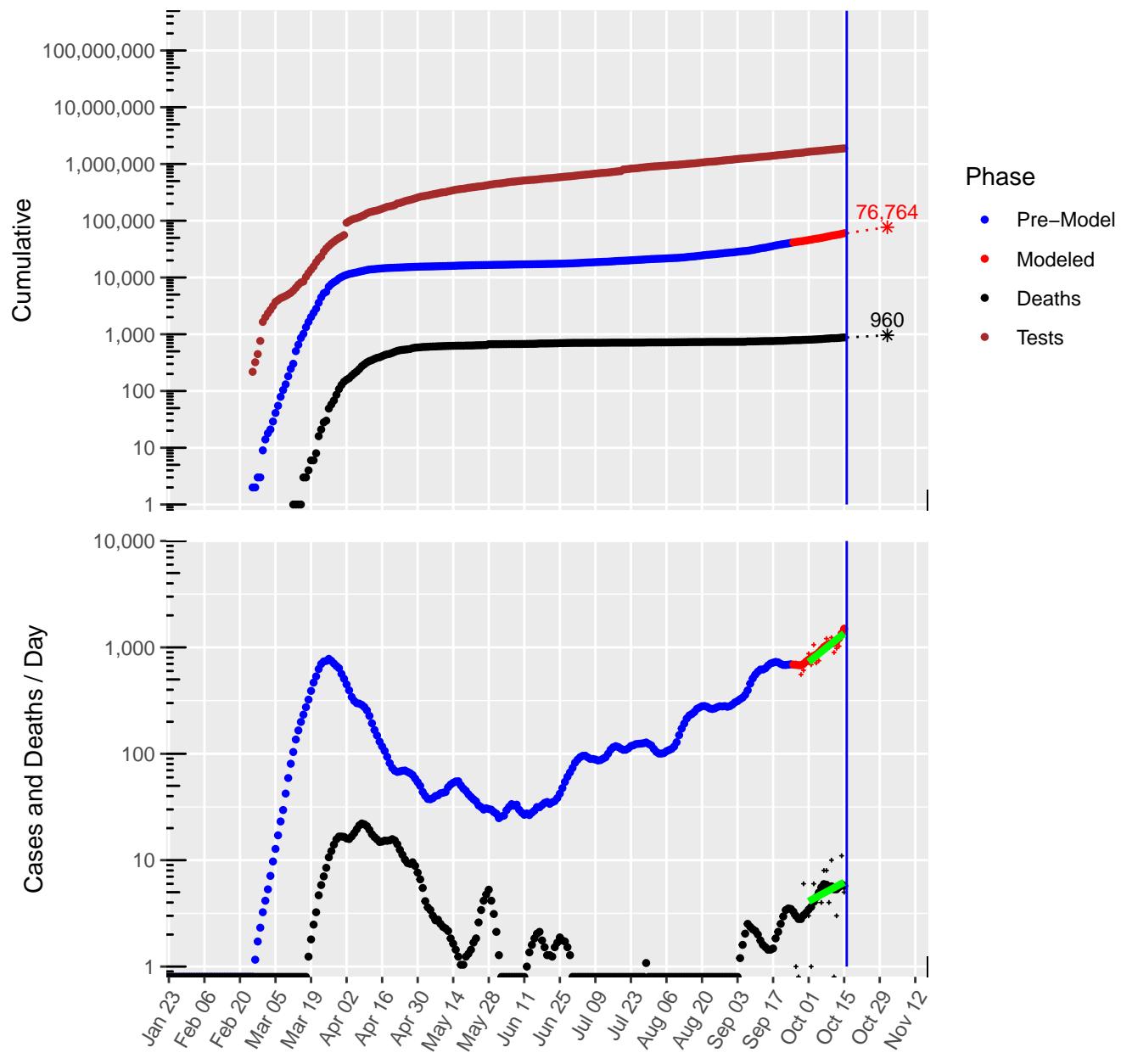
# Germany projection as of 2020-10-16



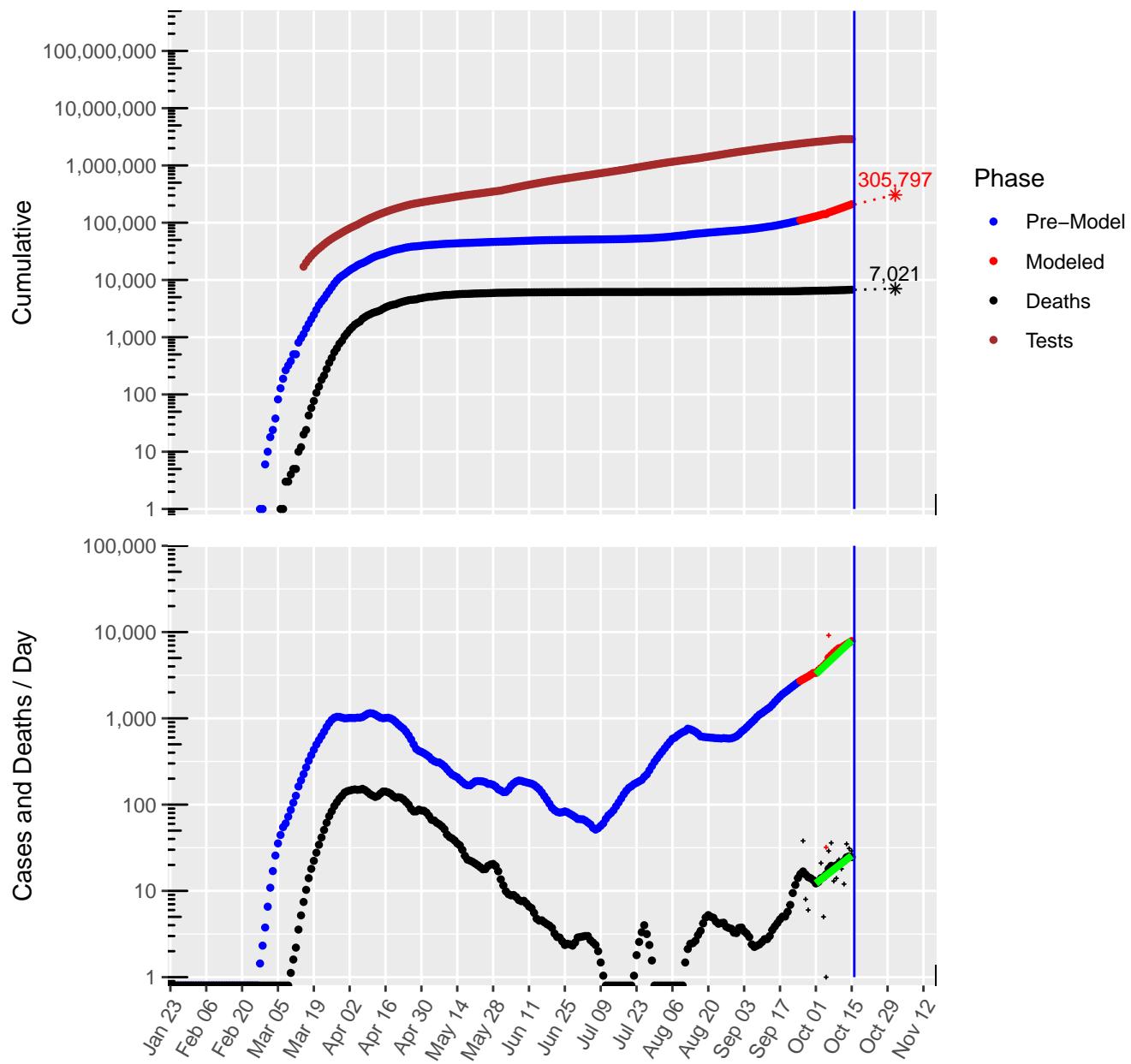
# Switzerland projection as of 2020-10-16



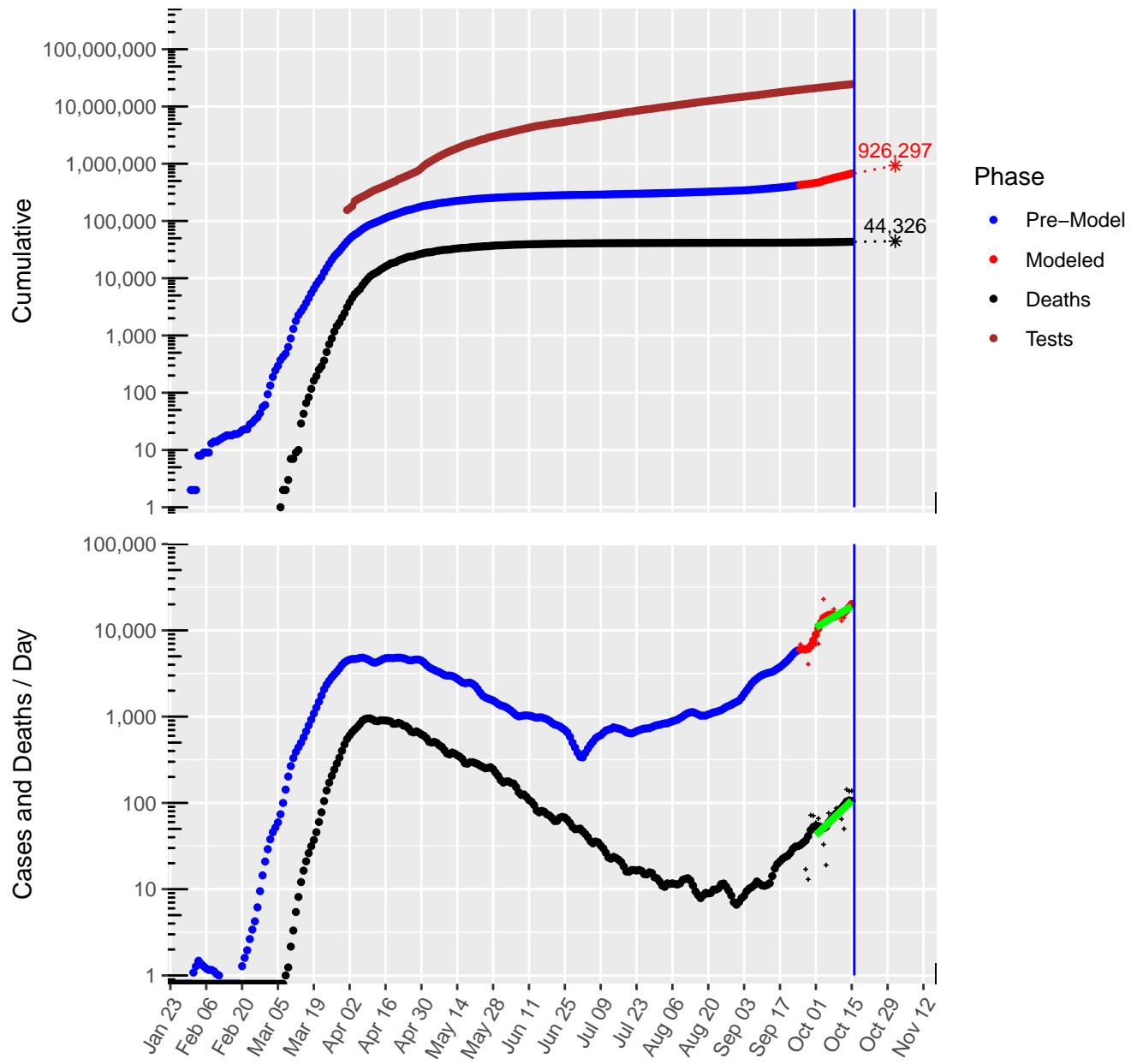
# Austria projection as of 2020-10-16



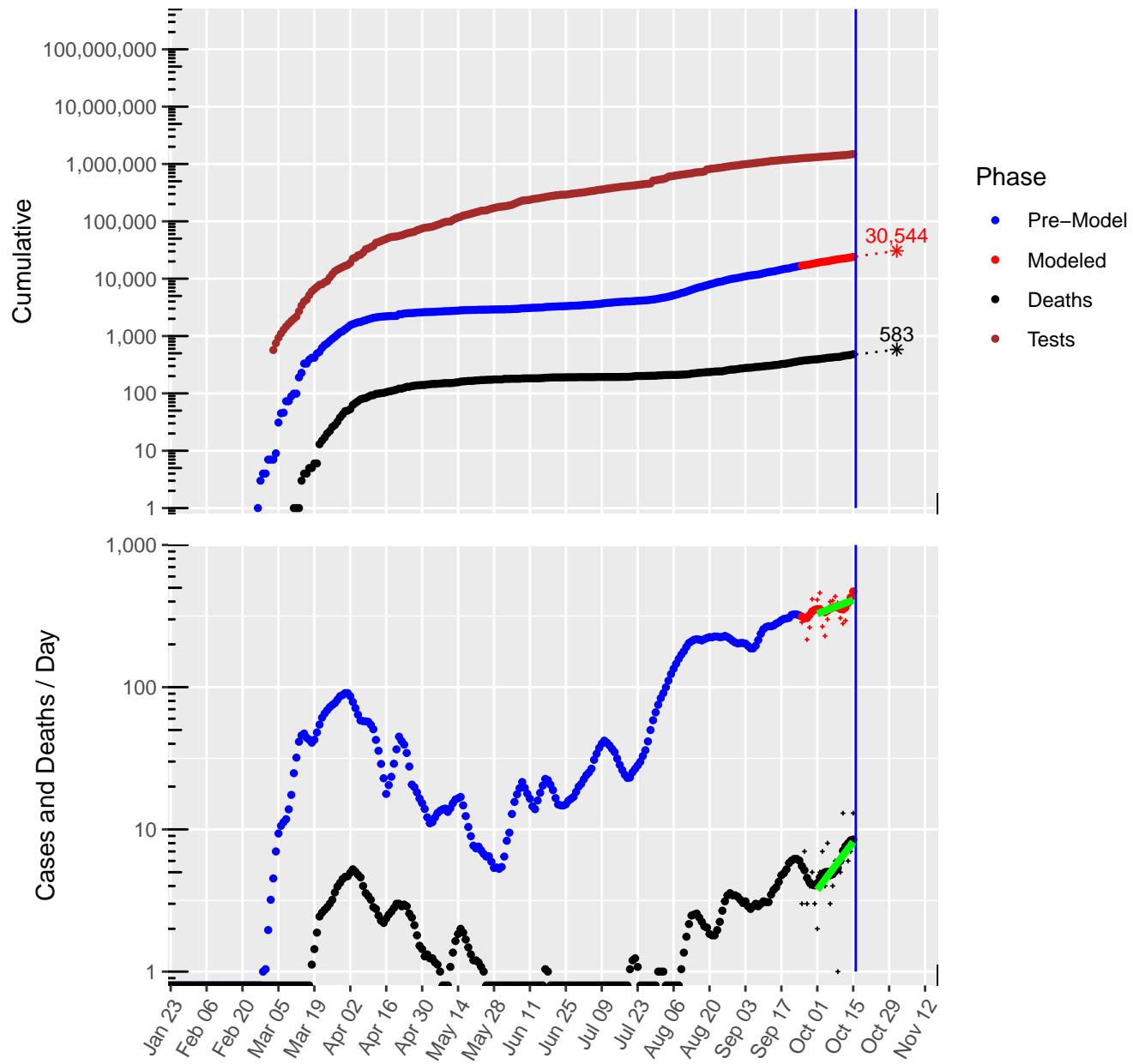
# Netherlands projection as of 2020-10-16



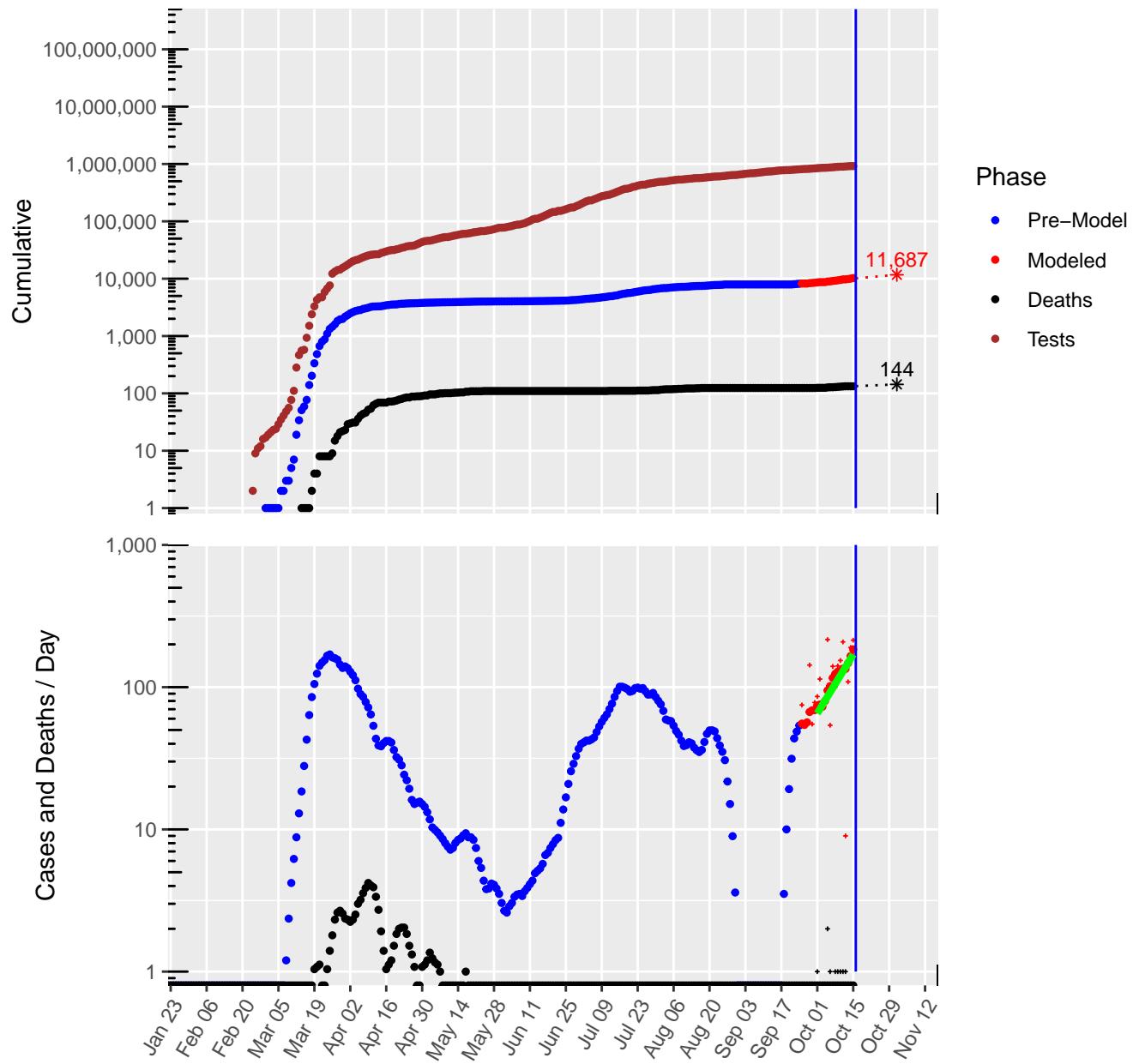
# United Kingdom projection as of 2020-10-16



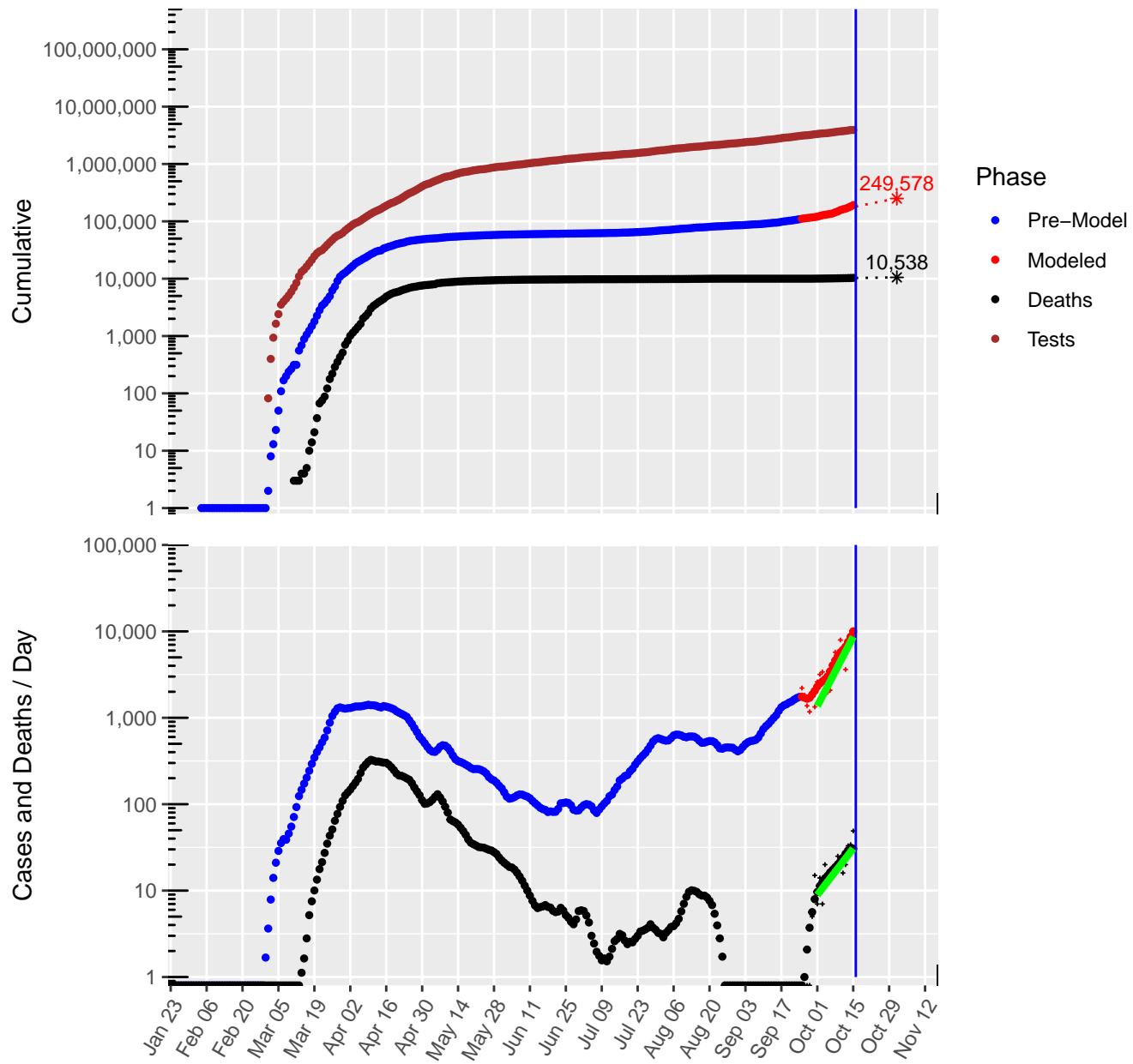
# Greece projection as of 2020-10-16



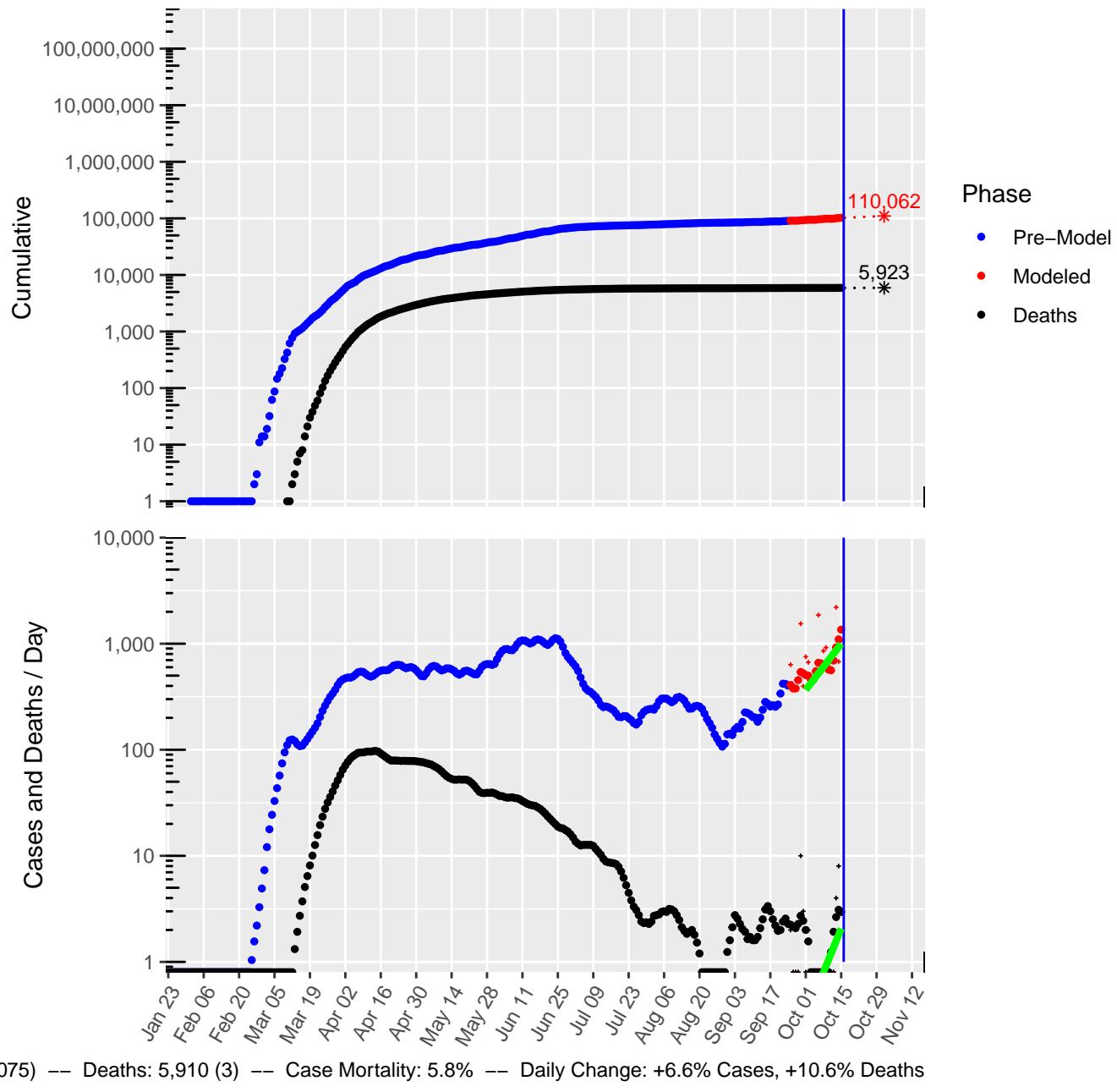
# Luxembourg projection as of 2020-10-16



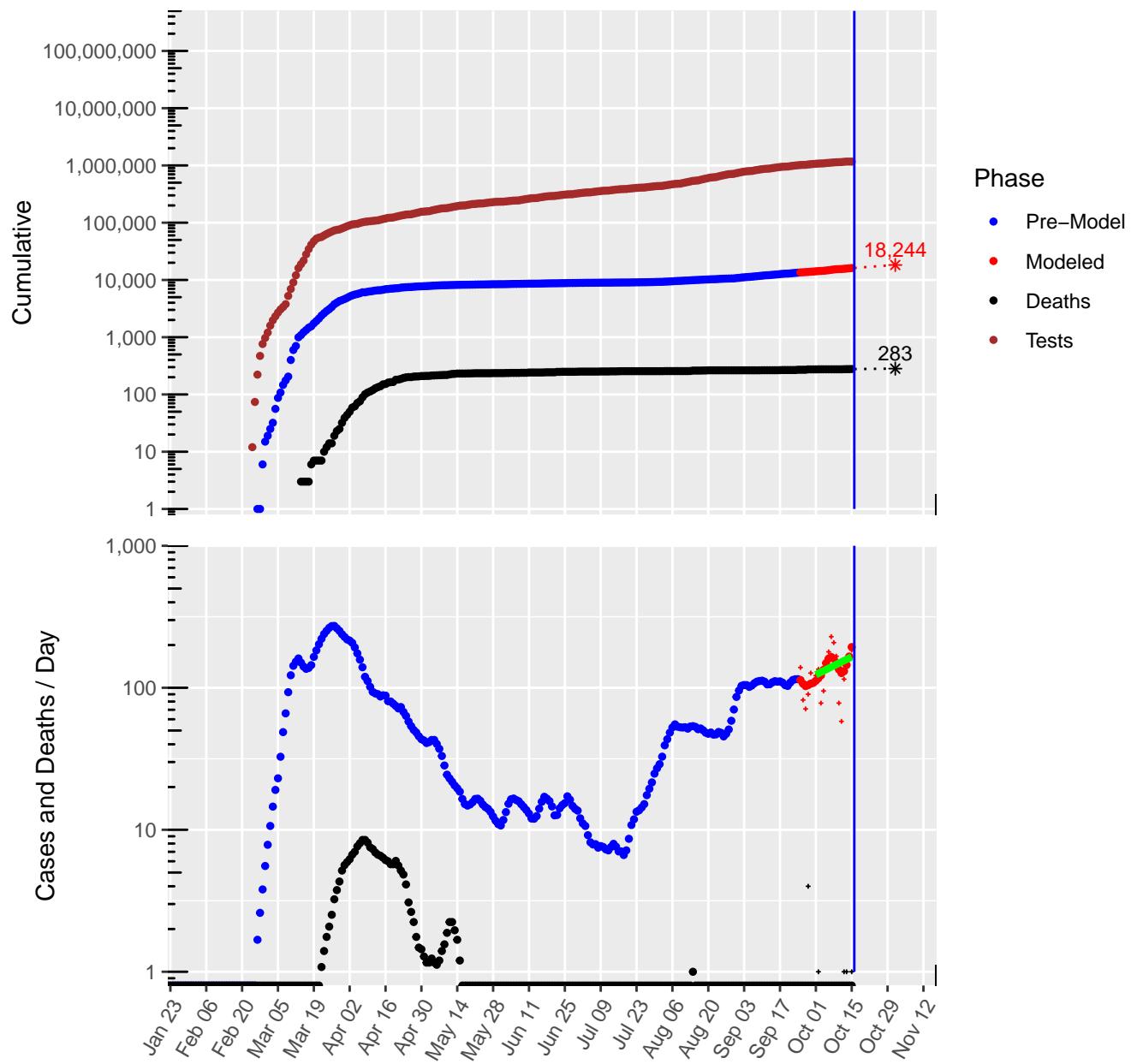
# Belgium projection as of 2020-10-16



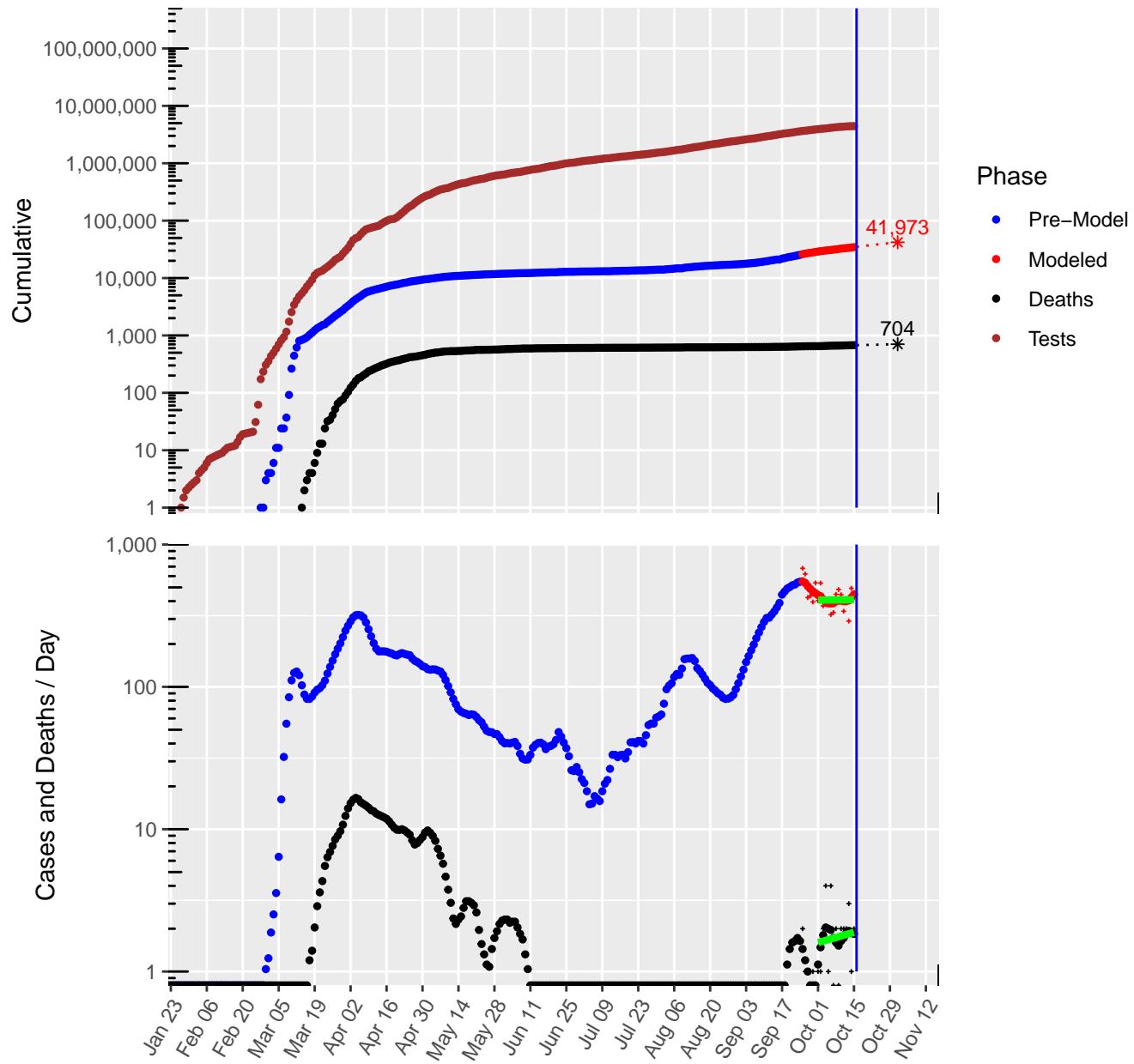
# Sweden projection as of 2020-10-16



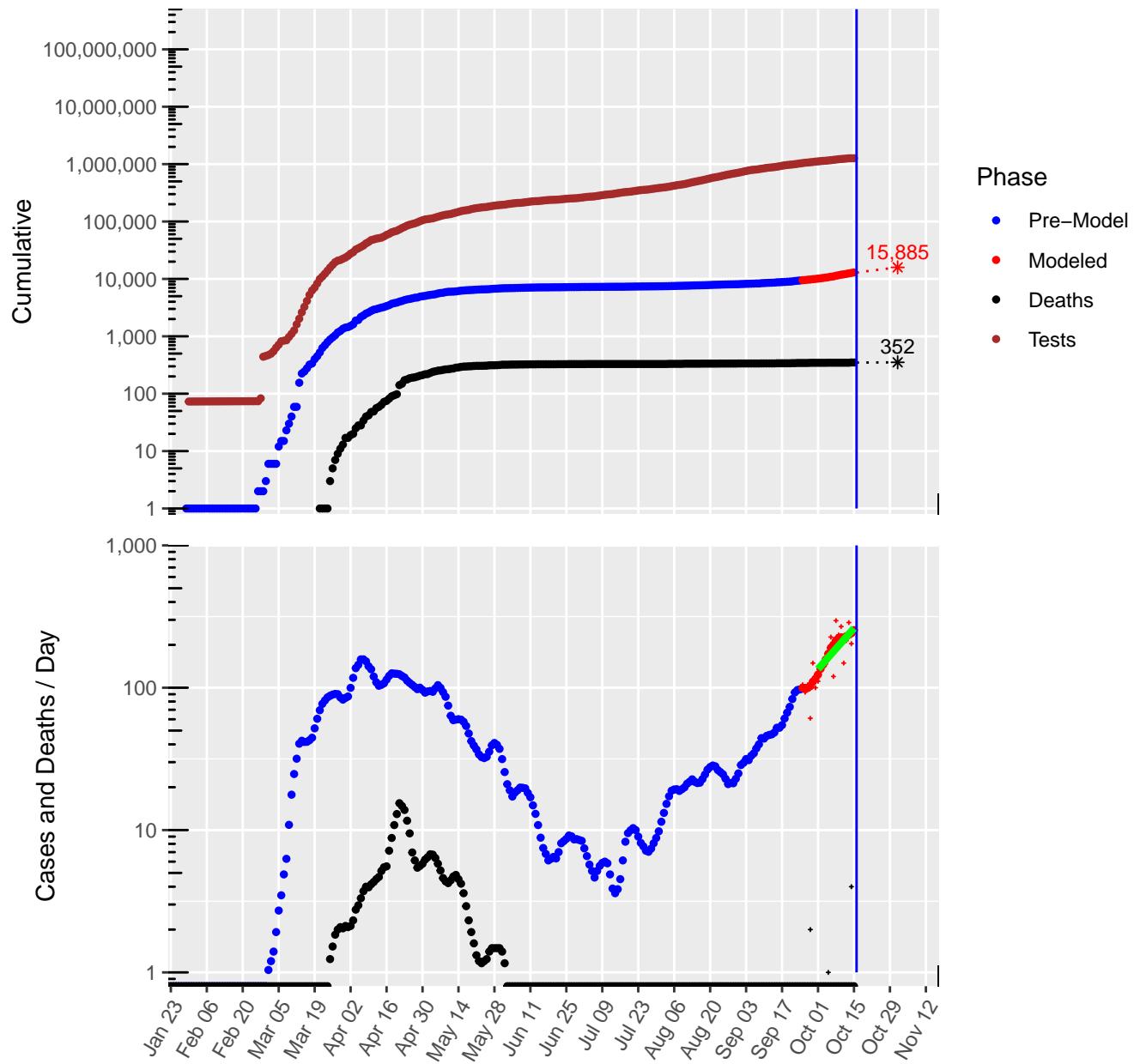
# Norway projection as of 2020-10-16



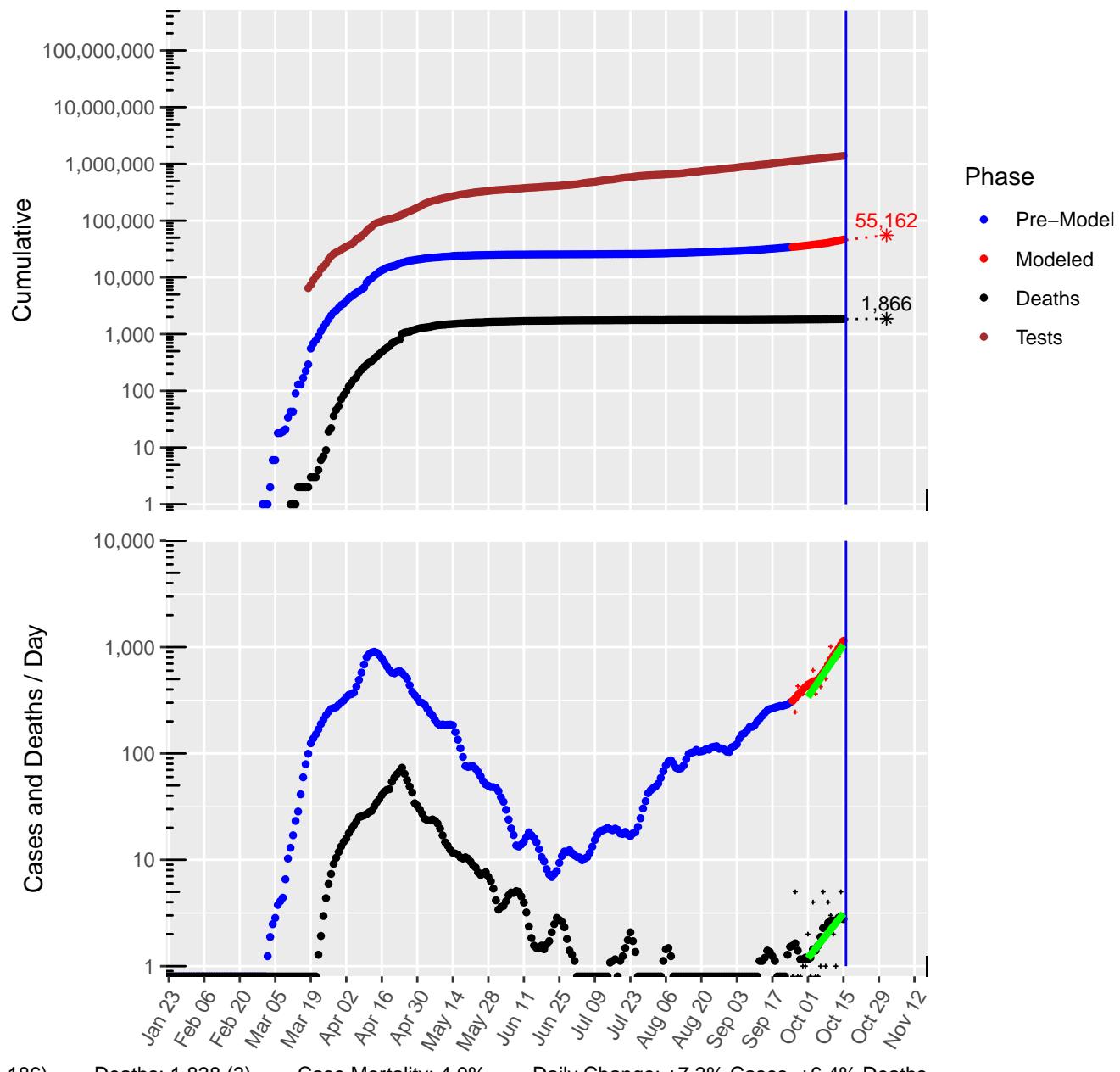
# Denmark projection as of 2020-10-16



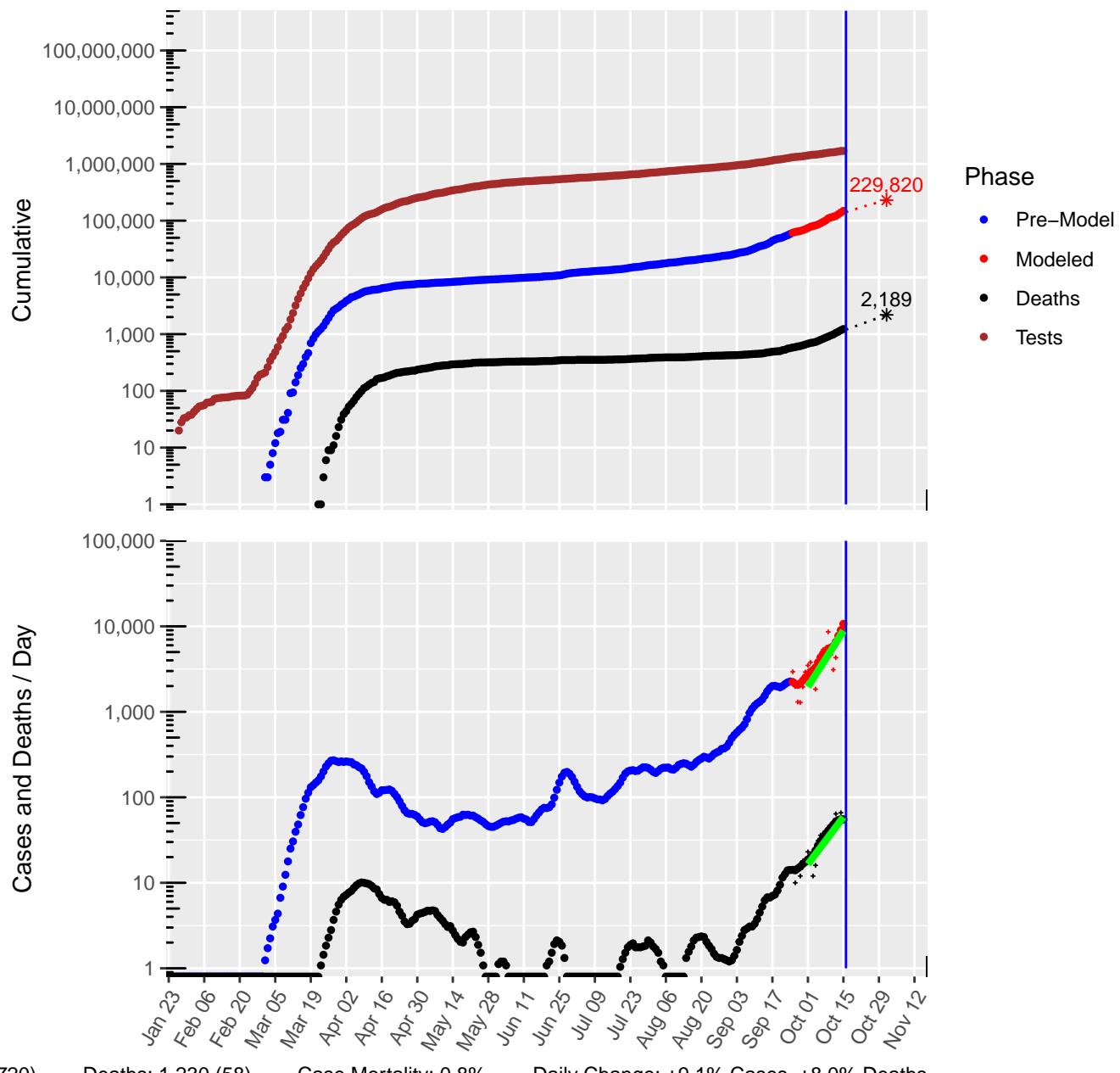
# Finland projection as of 2020-10-16



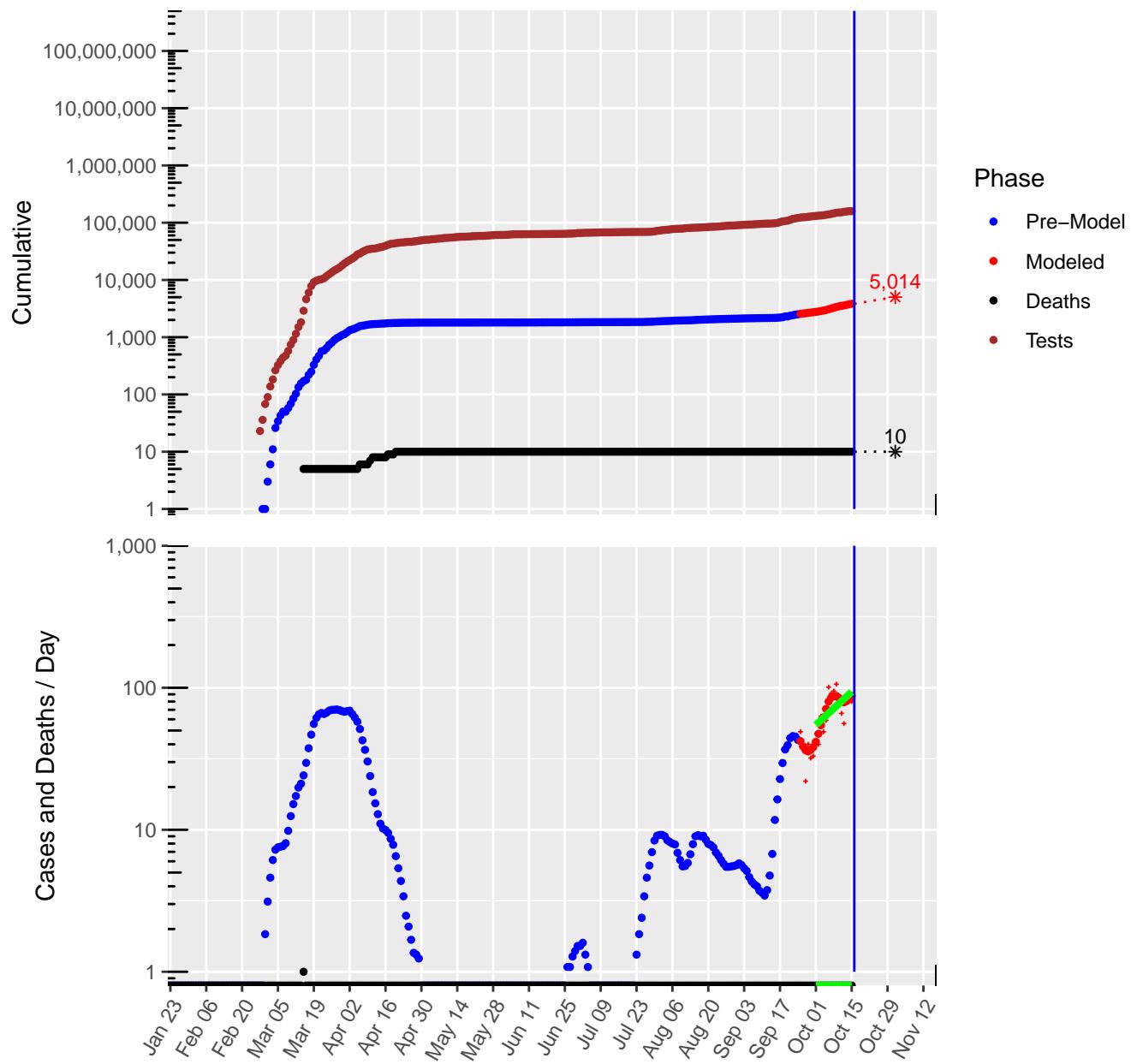
# Ireland projection as of 2020-10-16



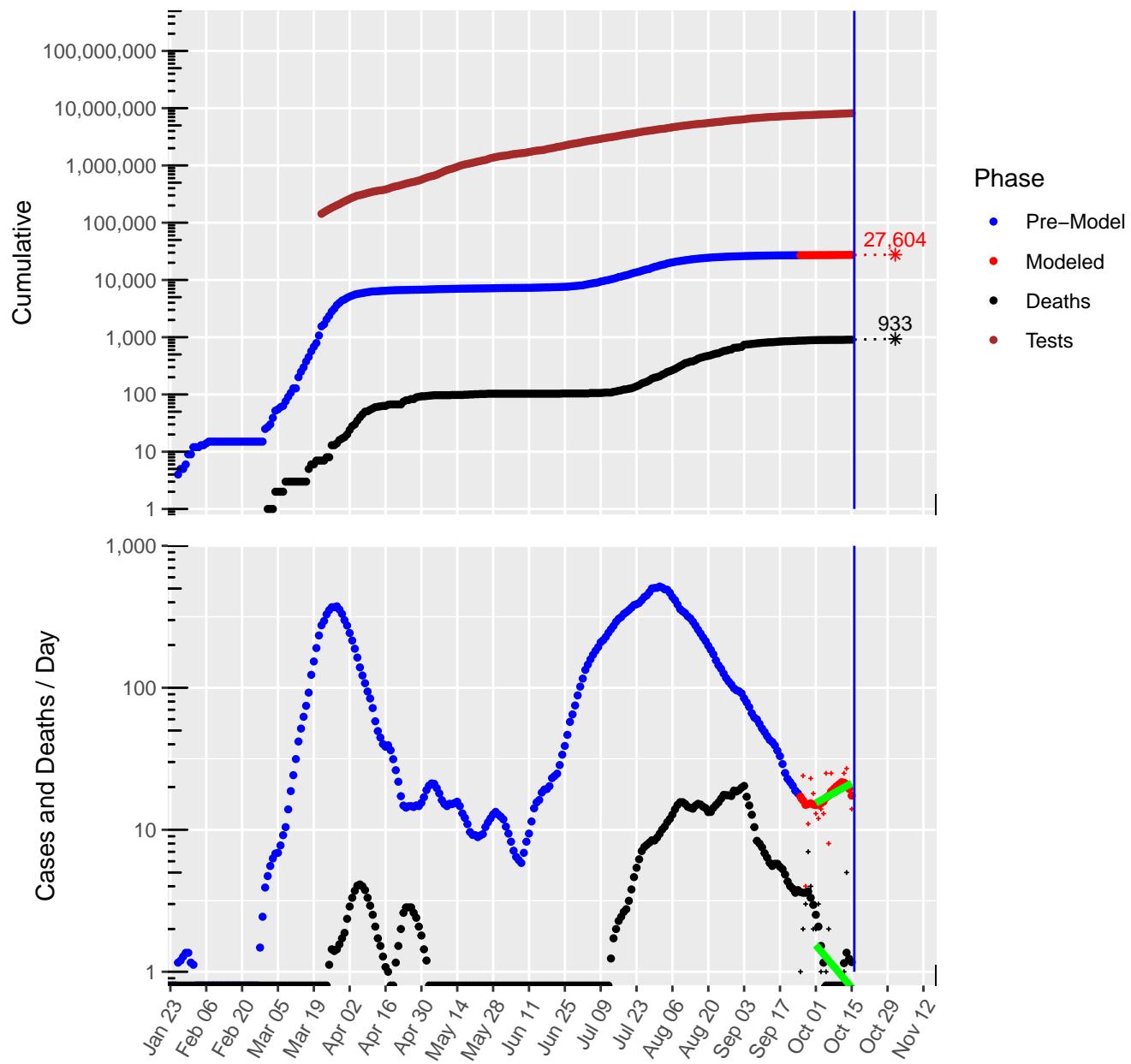
# Czech Republic projection as of 2020-10-16



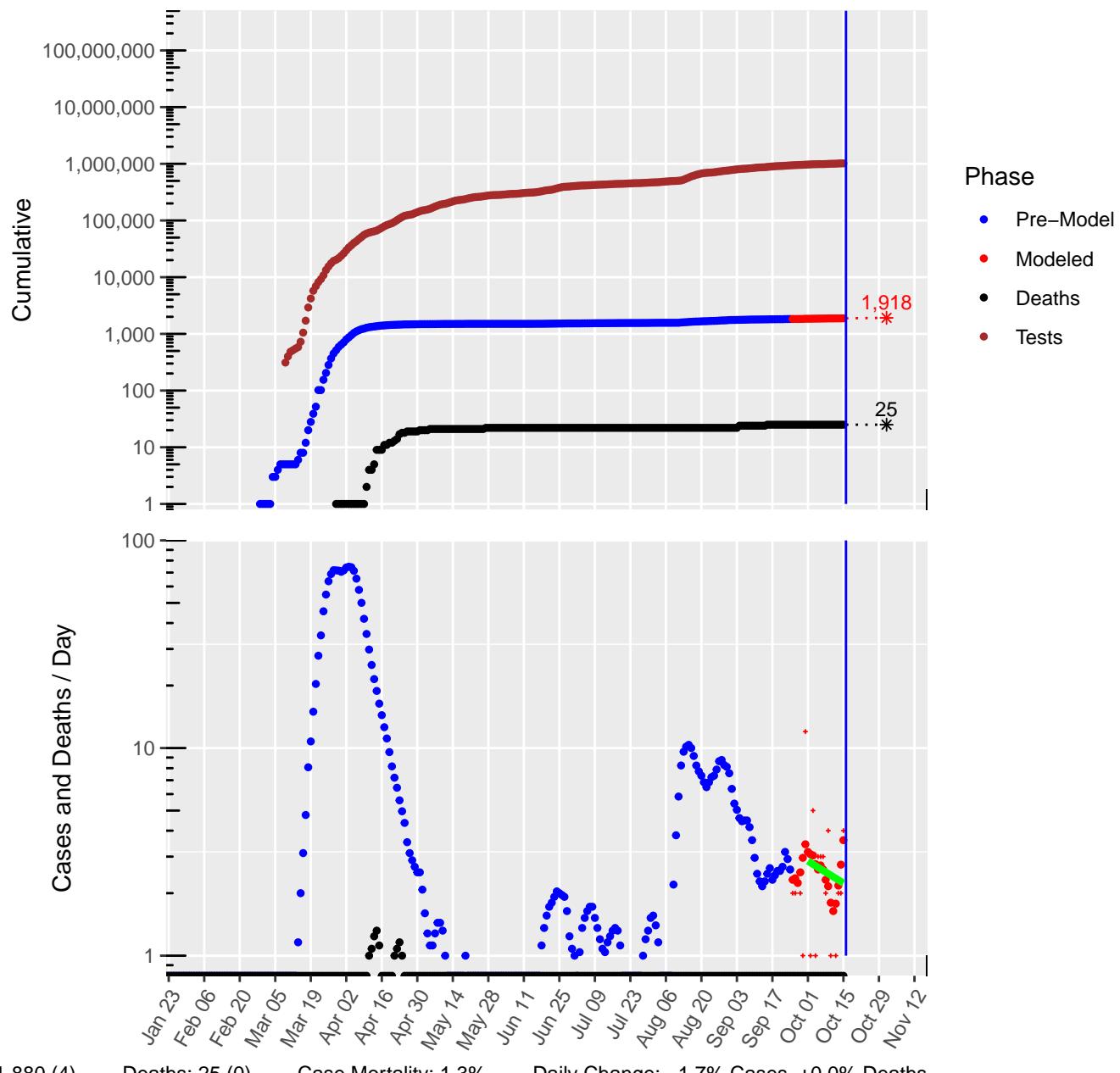
# Iceland projection as of 2020-10-16



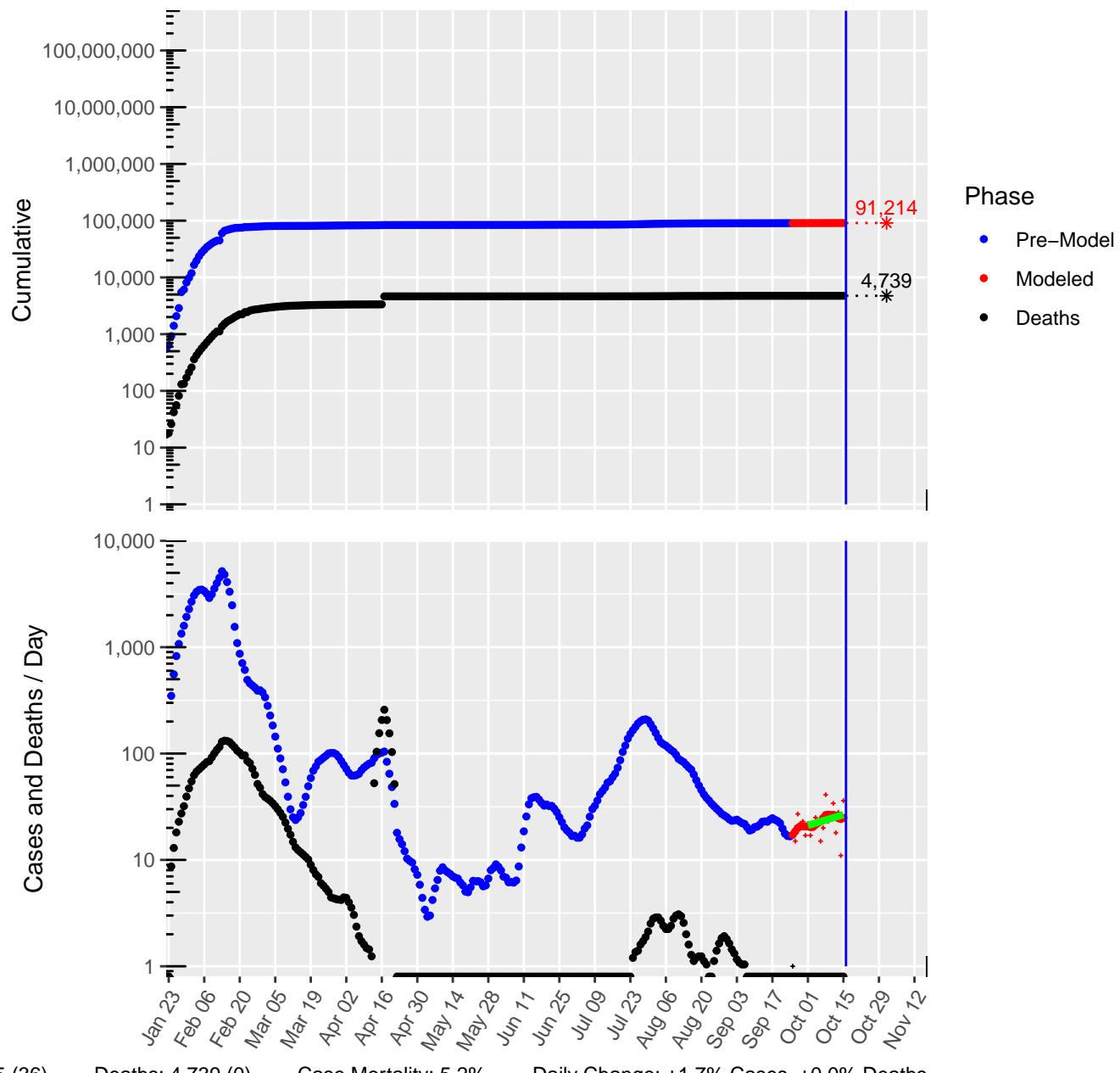
# Australia projection as of 2020-10-16



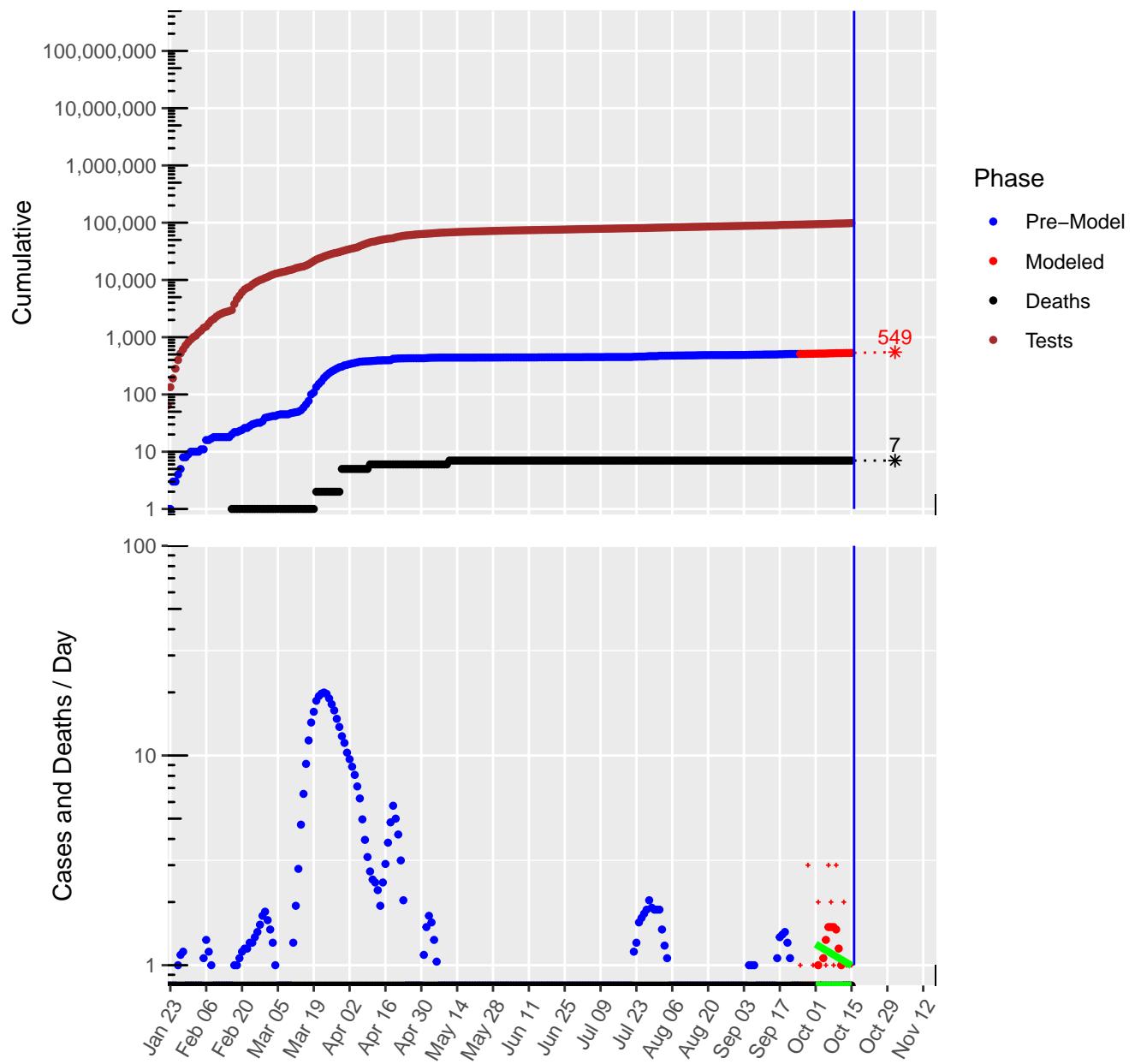
# New Zealand projection as of 2020-10-16



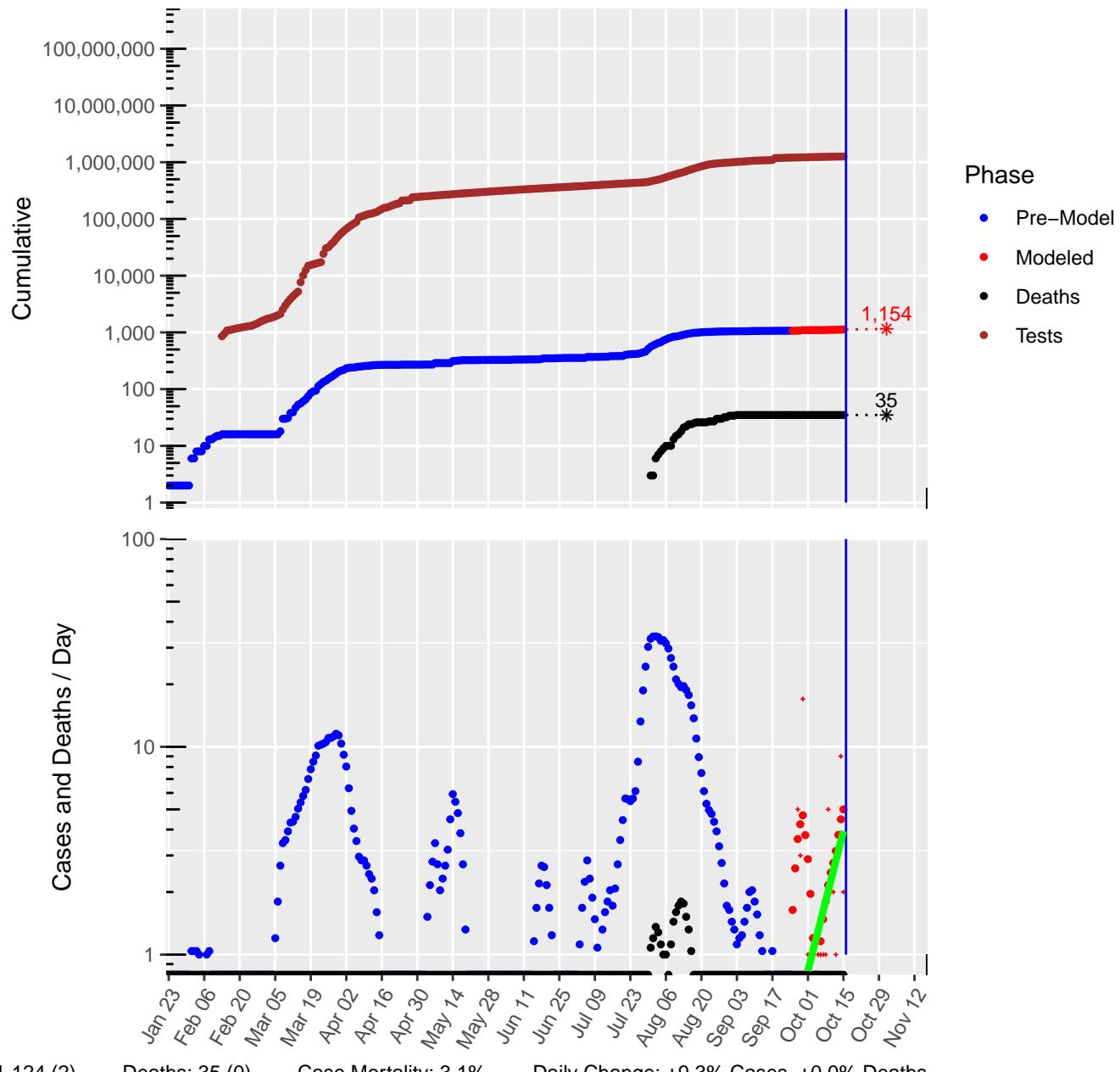
# China projection as of 2020-10-16



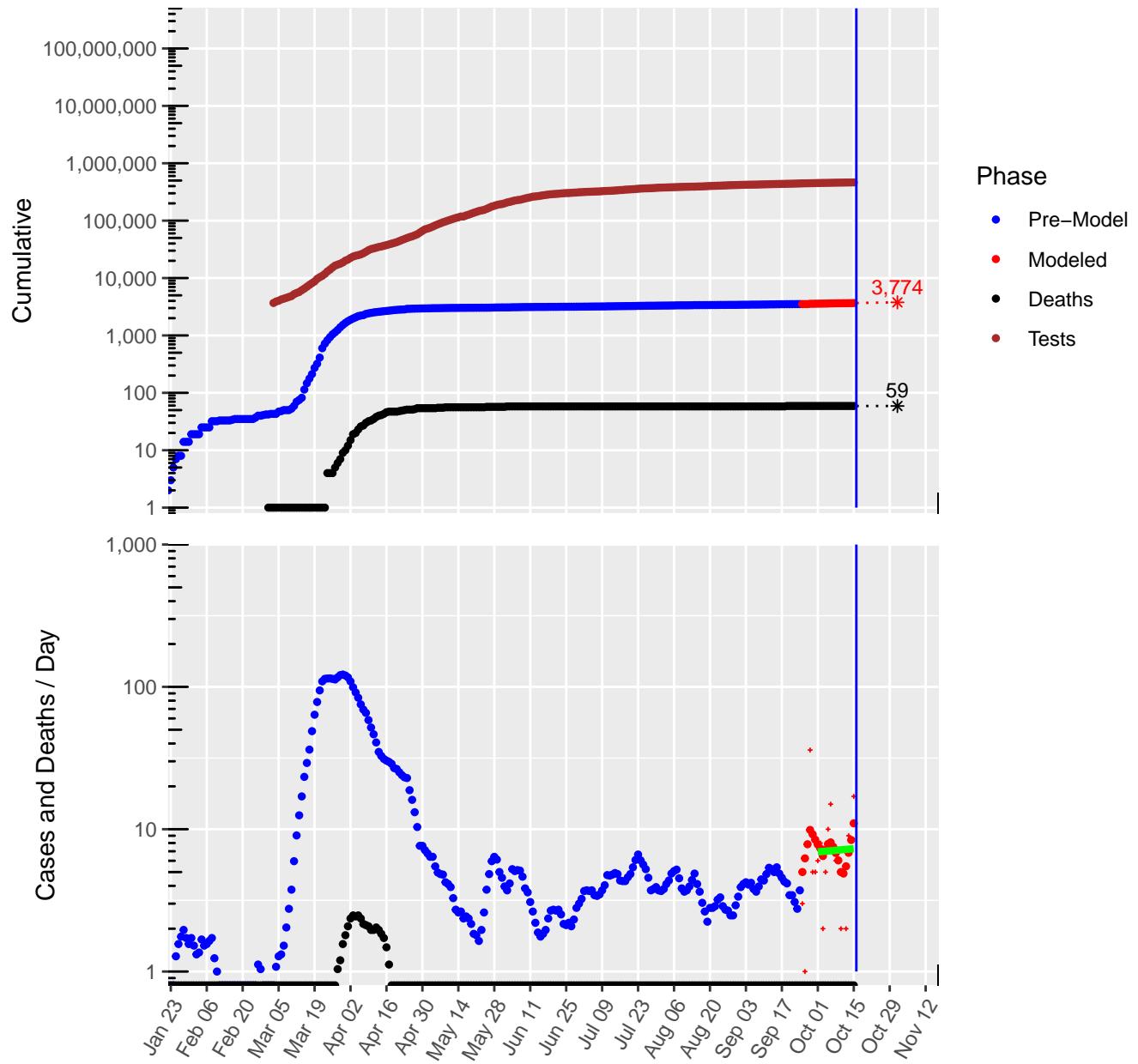
# Taiwan projection as of 2020-10-16



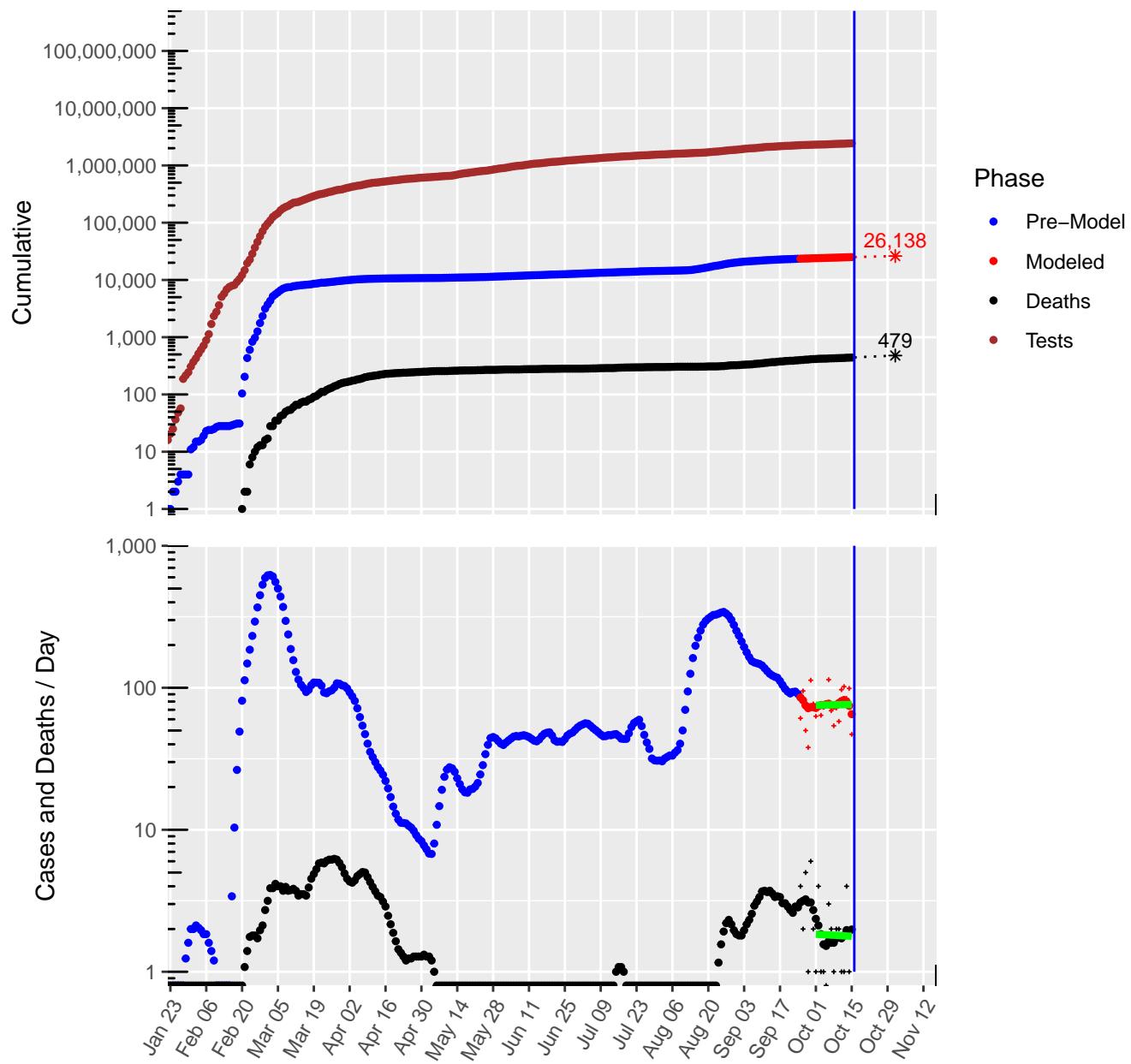
# Vietnam projection as of 2020-10-16



# Thailand projection as of 2020-10-16

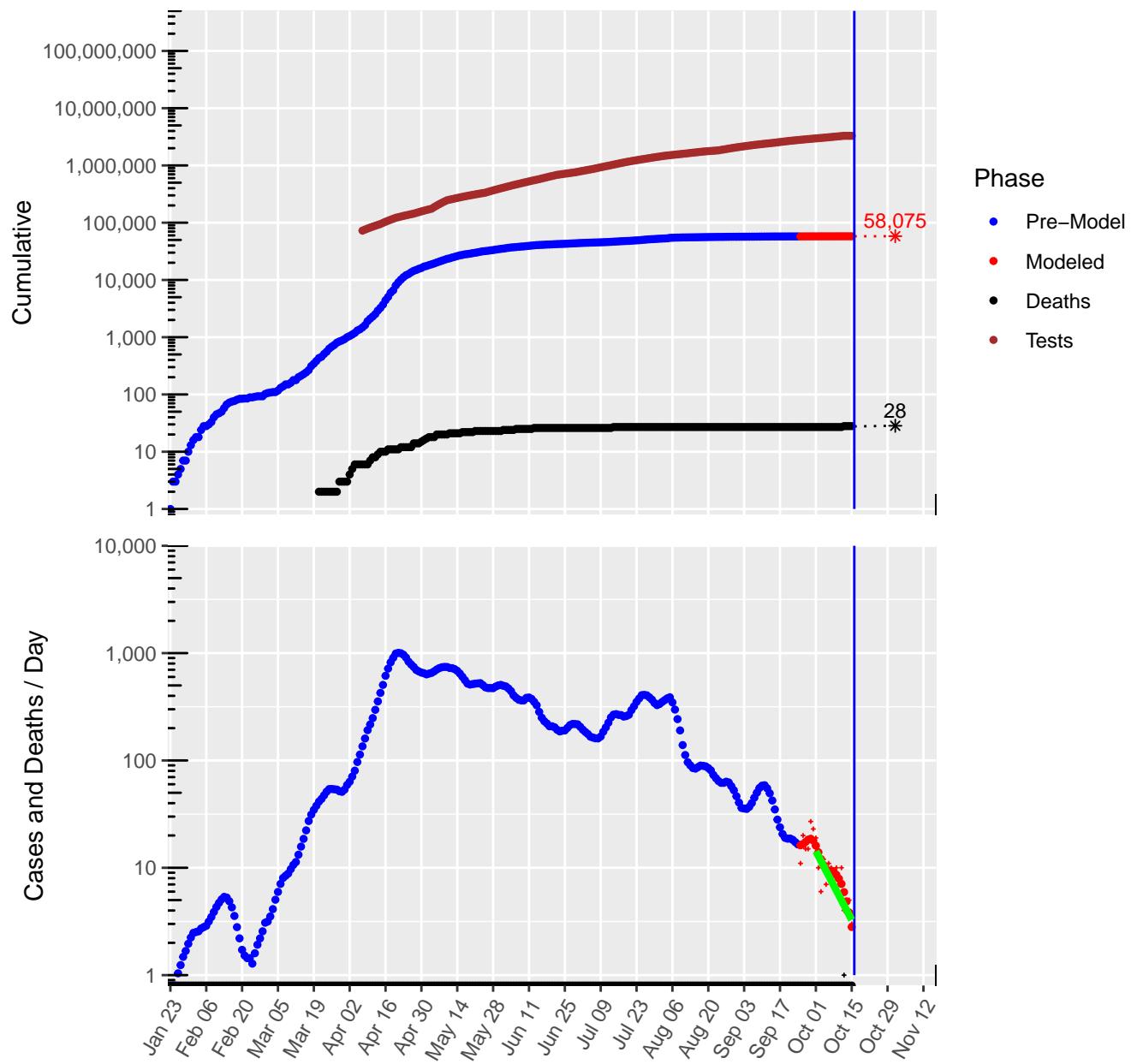


# South Korea projection as of 2020-10-16

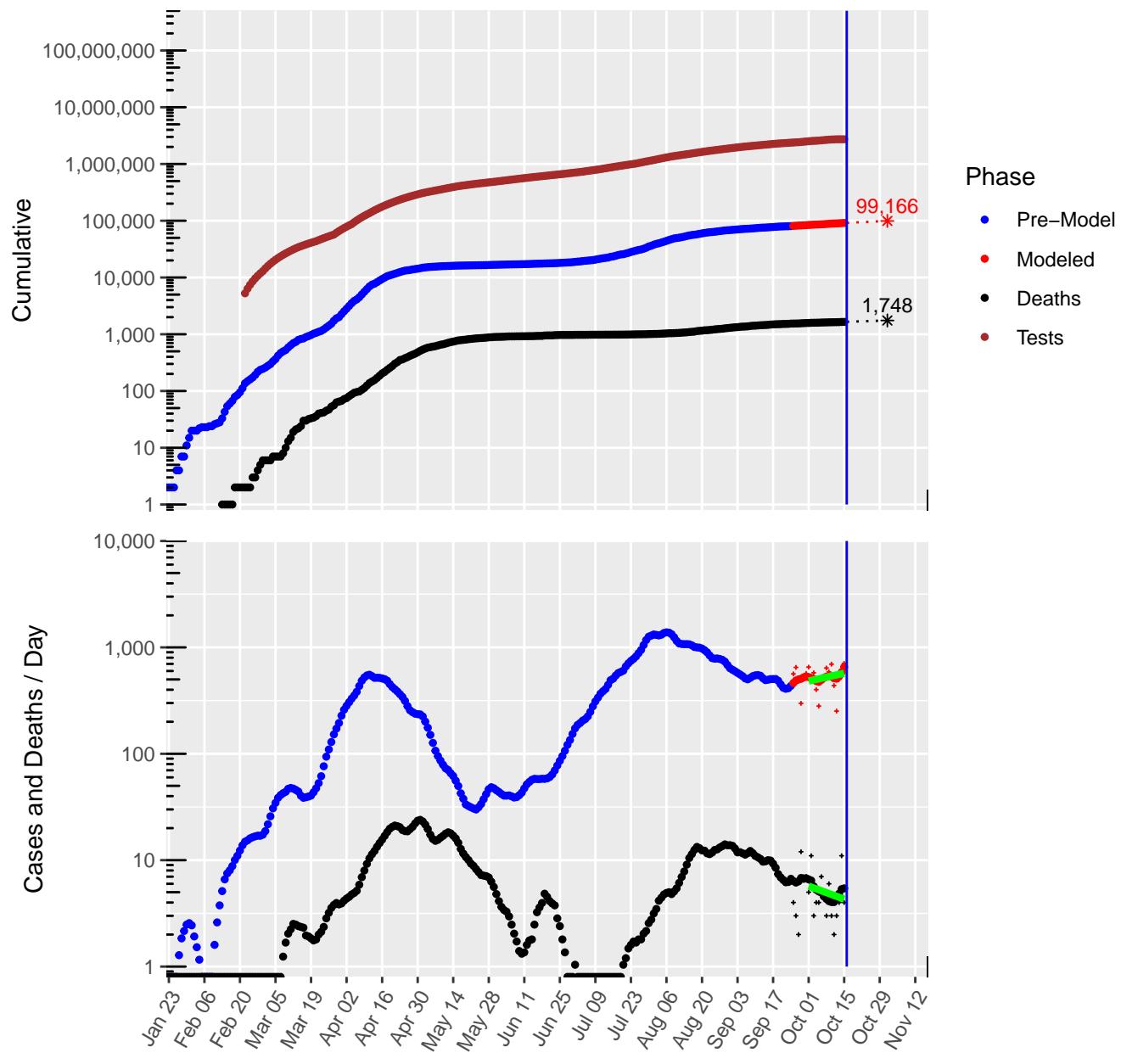


35 (47) — Deaths: 441 (2) — Case Mortality: 1.8% — Daily Change: +0.1% Cases, -0.2% Deaths

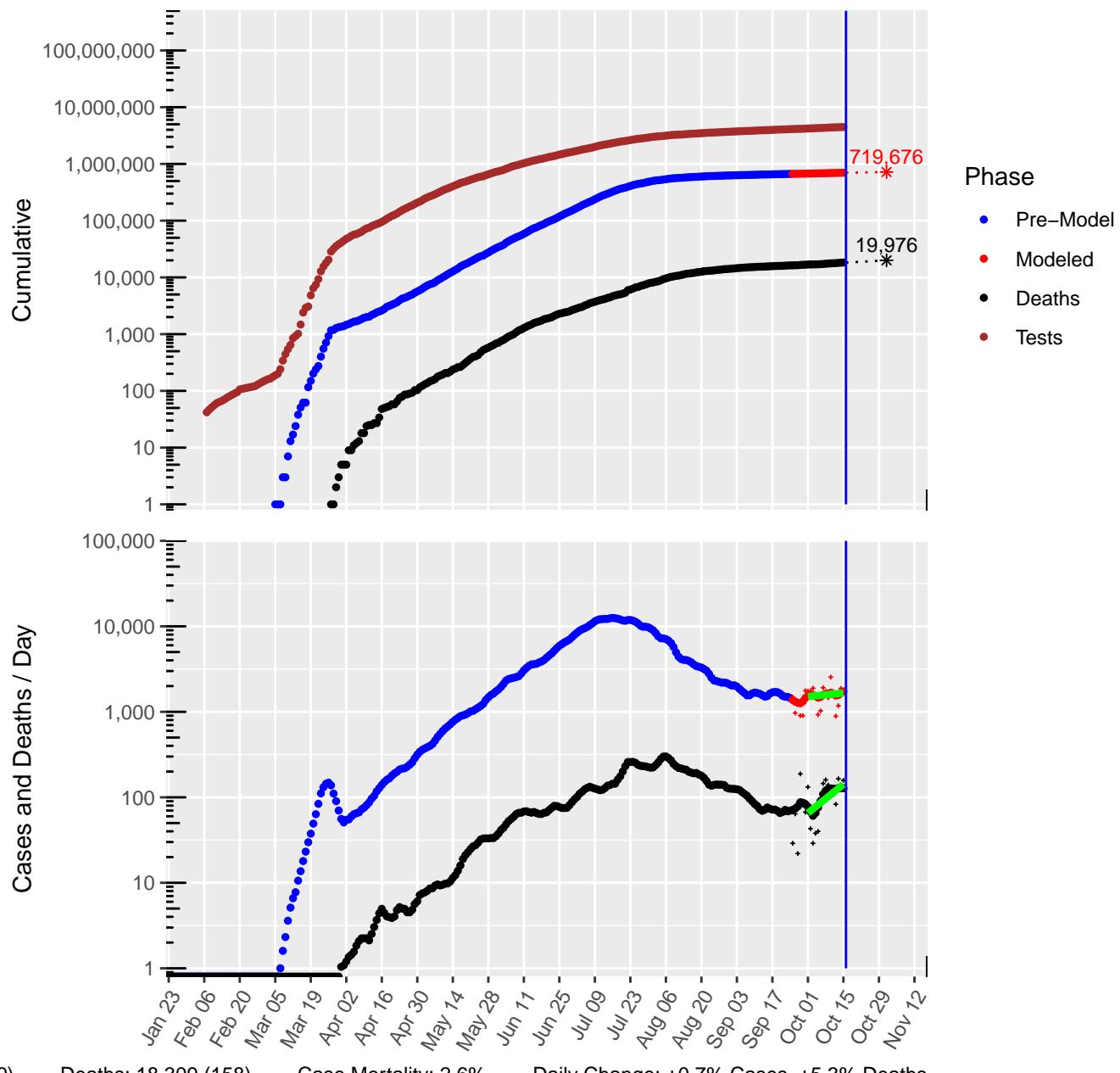
# Singapore projection as of 2020-10-16



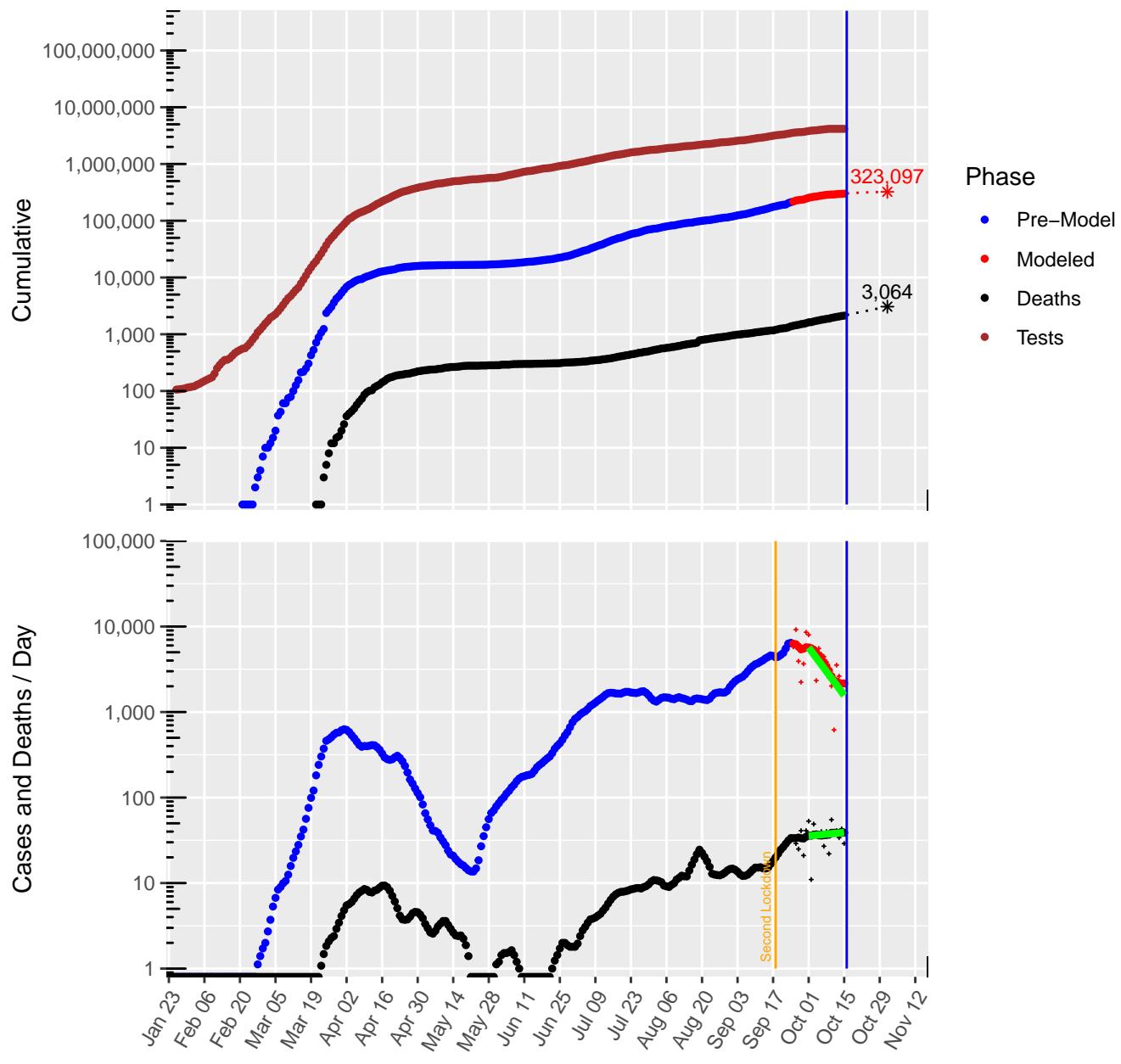
# Japan projection as of 2020-10-16



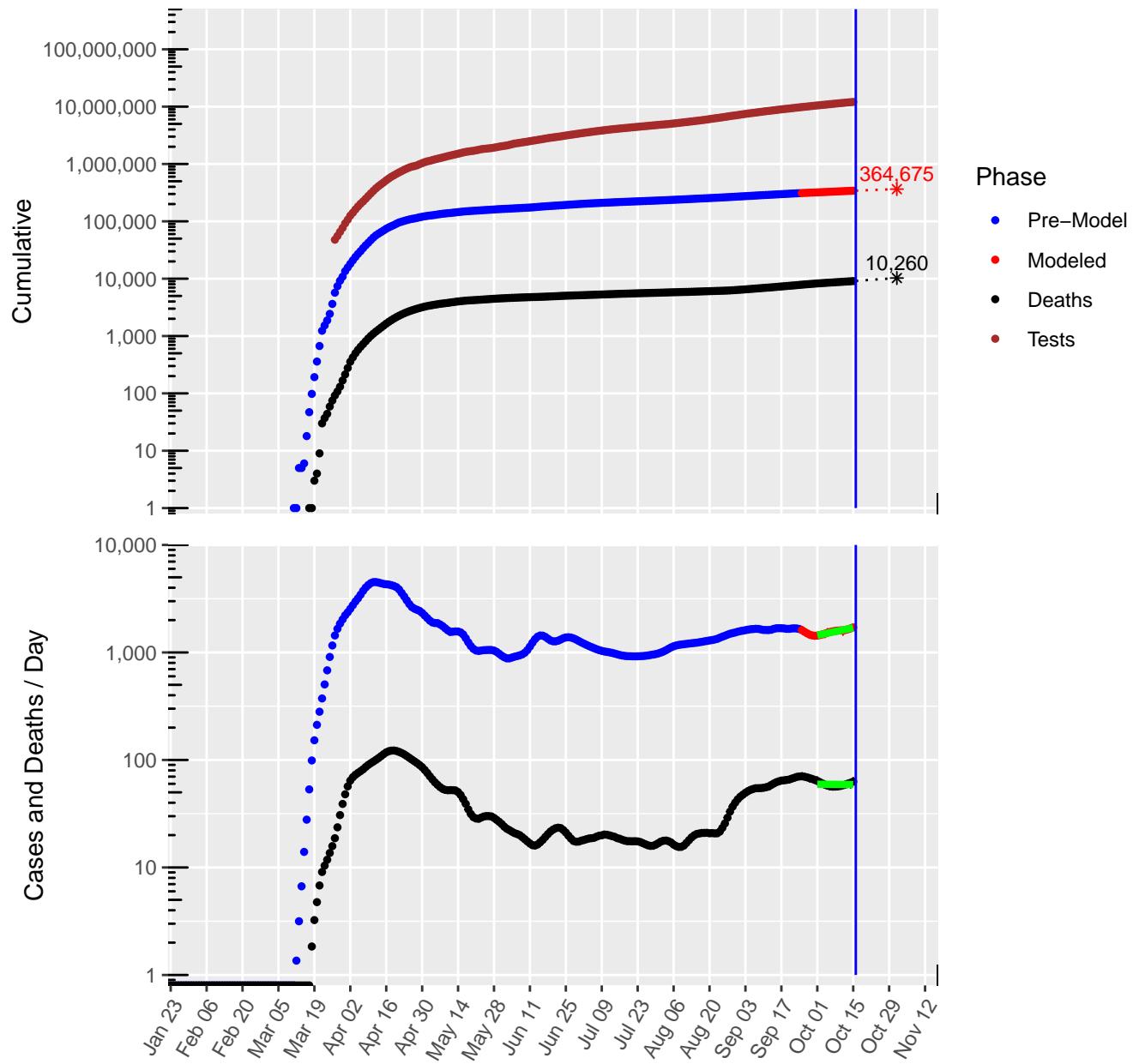
# South Africa projection as of 2020-10-16



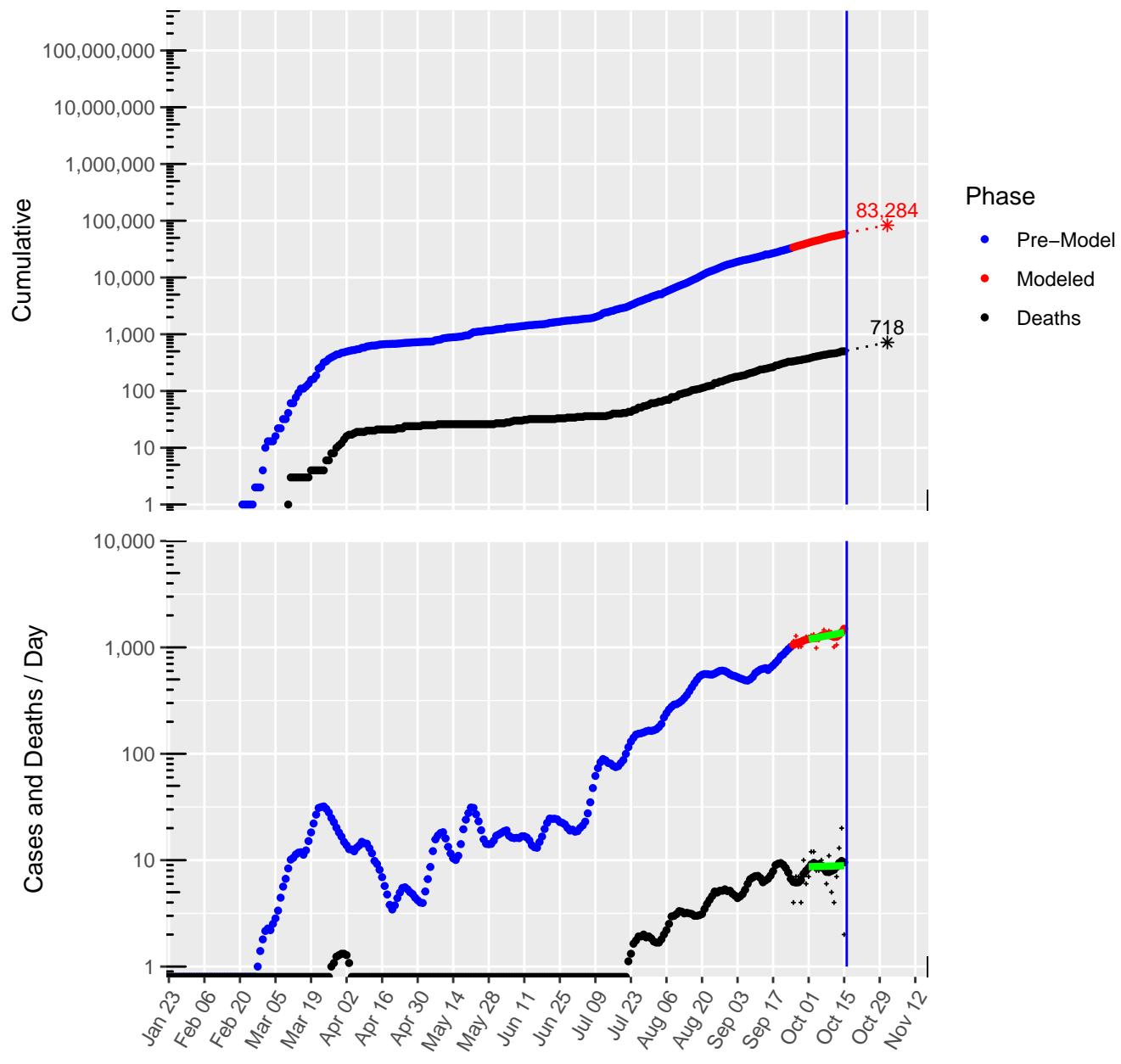
# Israel projection as of 2020-10-16



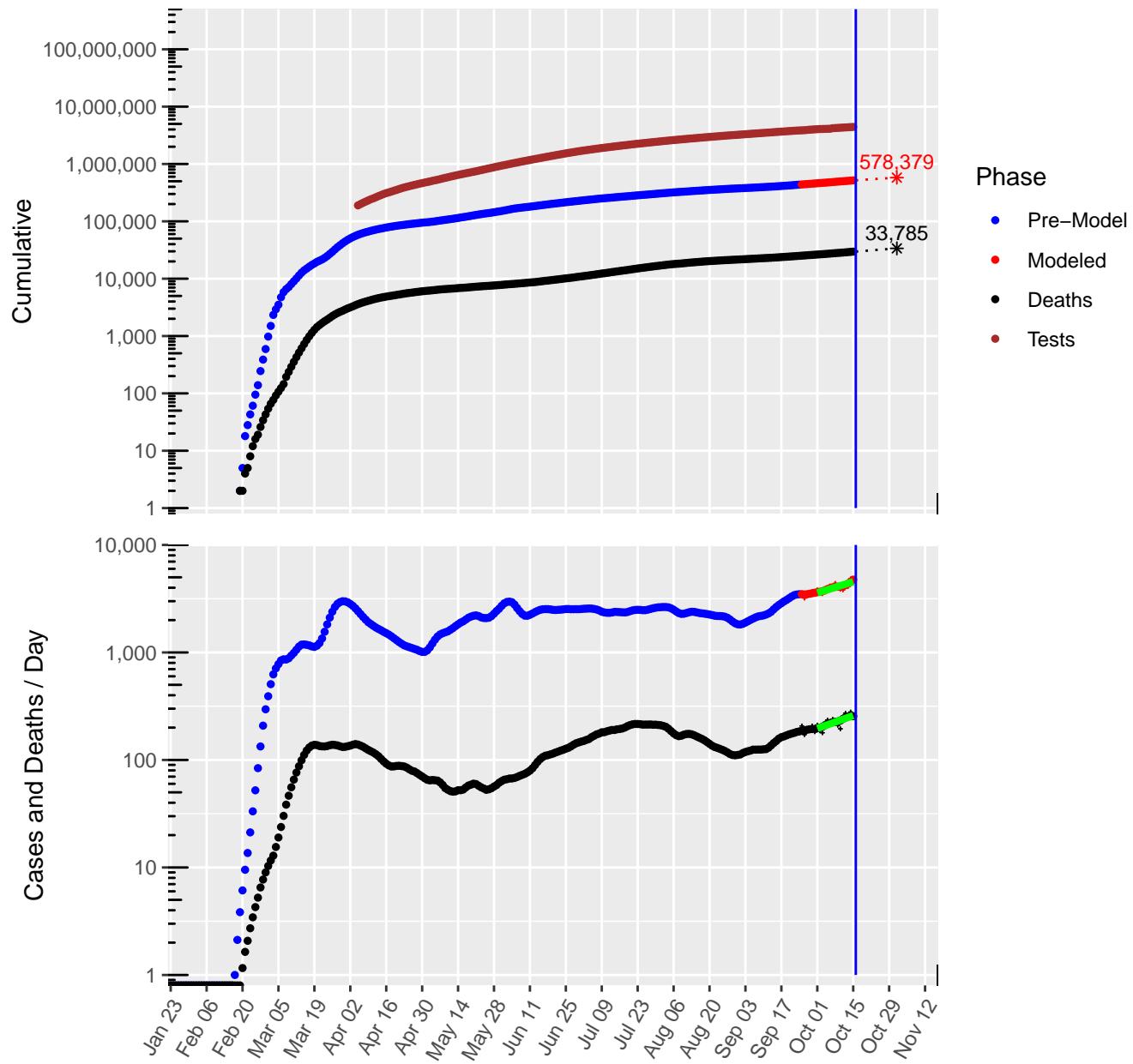
# Turkey projection as of 2020-10-16



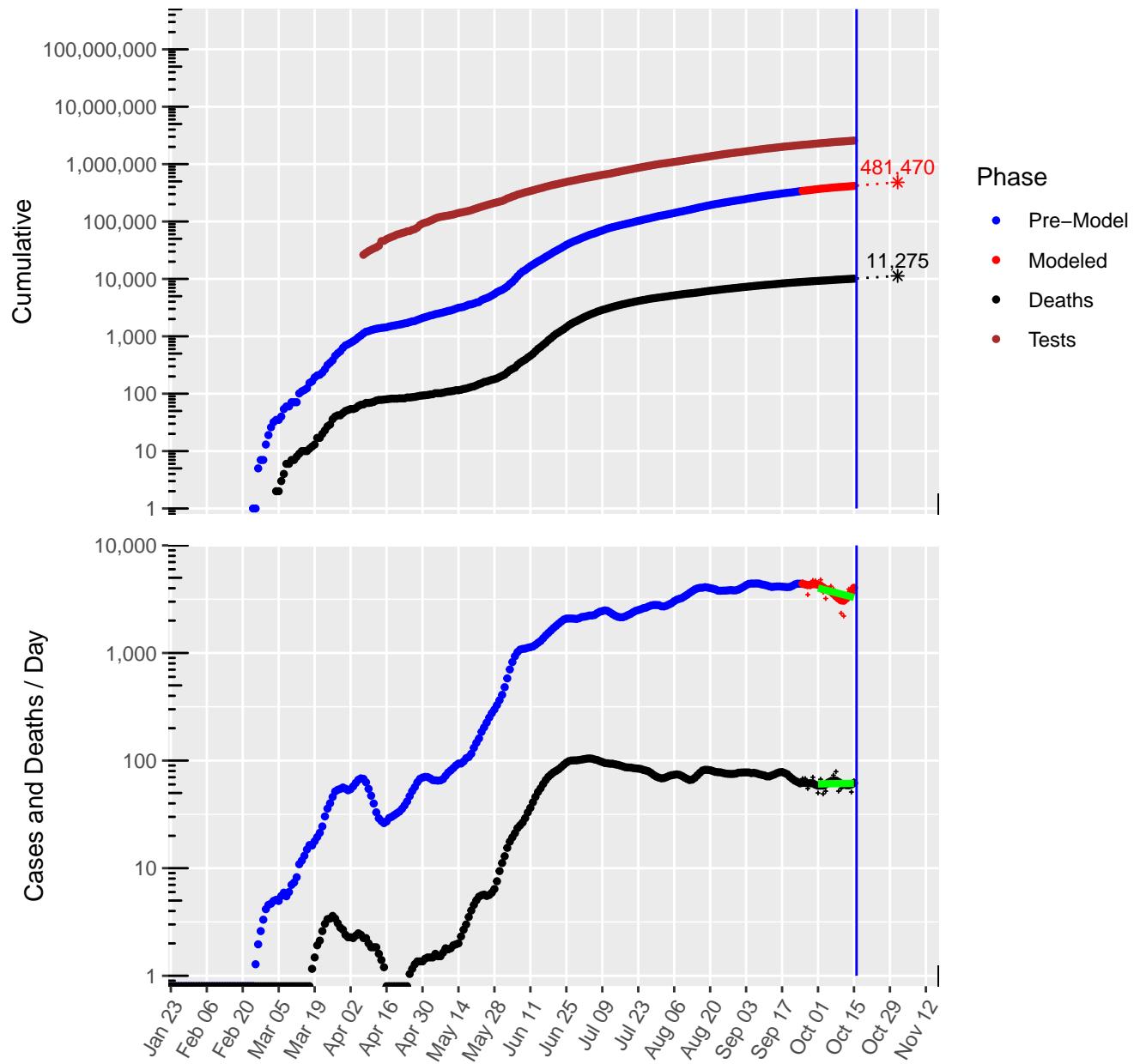
# Lebanon projection as of 2020-10-16



# Iran projection as of 2020-10-16

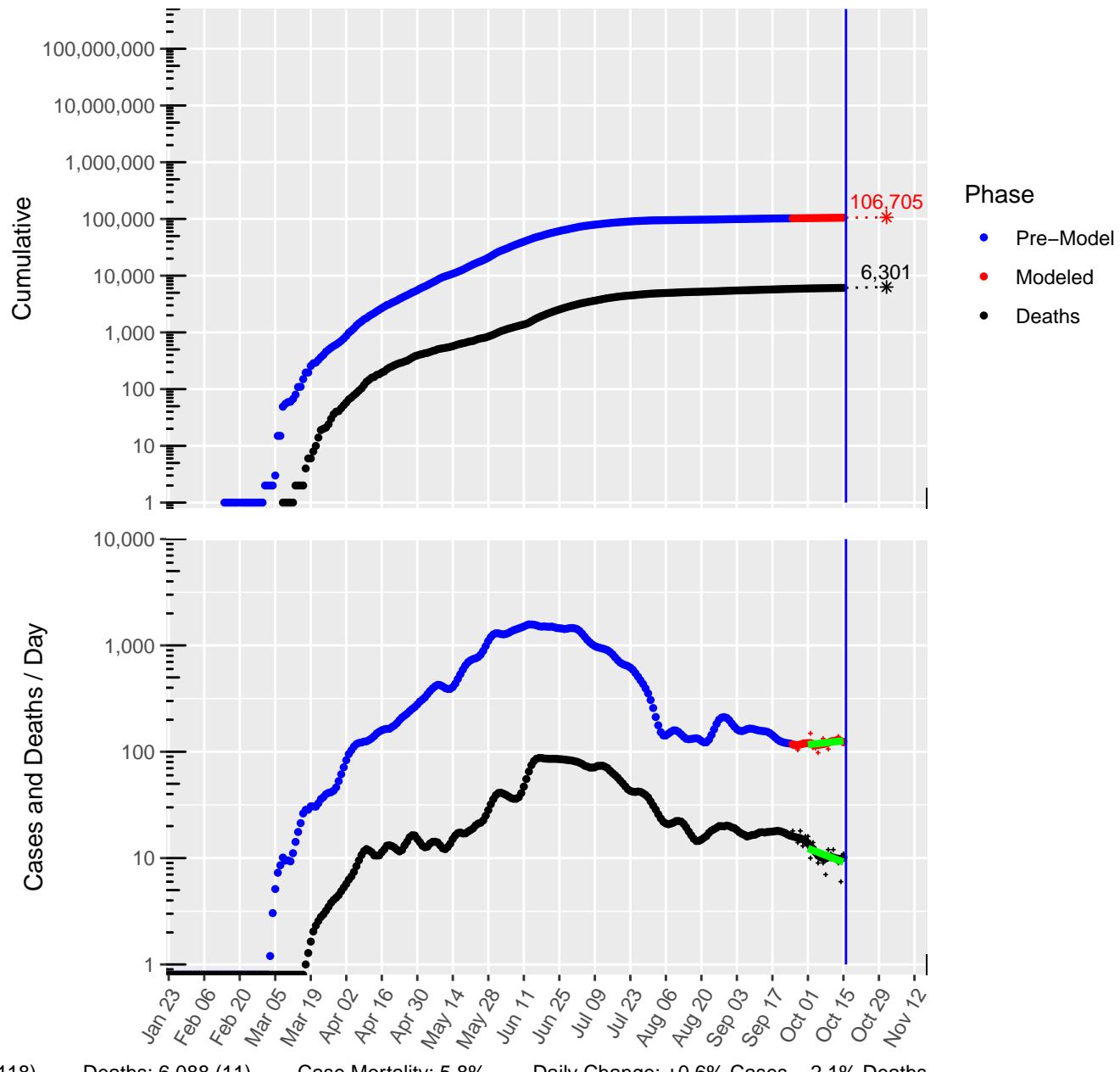


# Iraq projection as of 2020-10-16

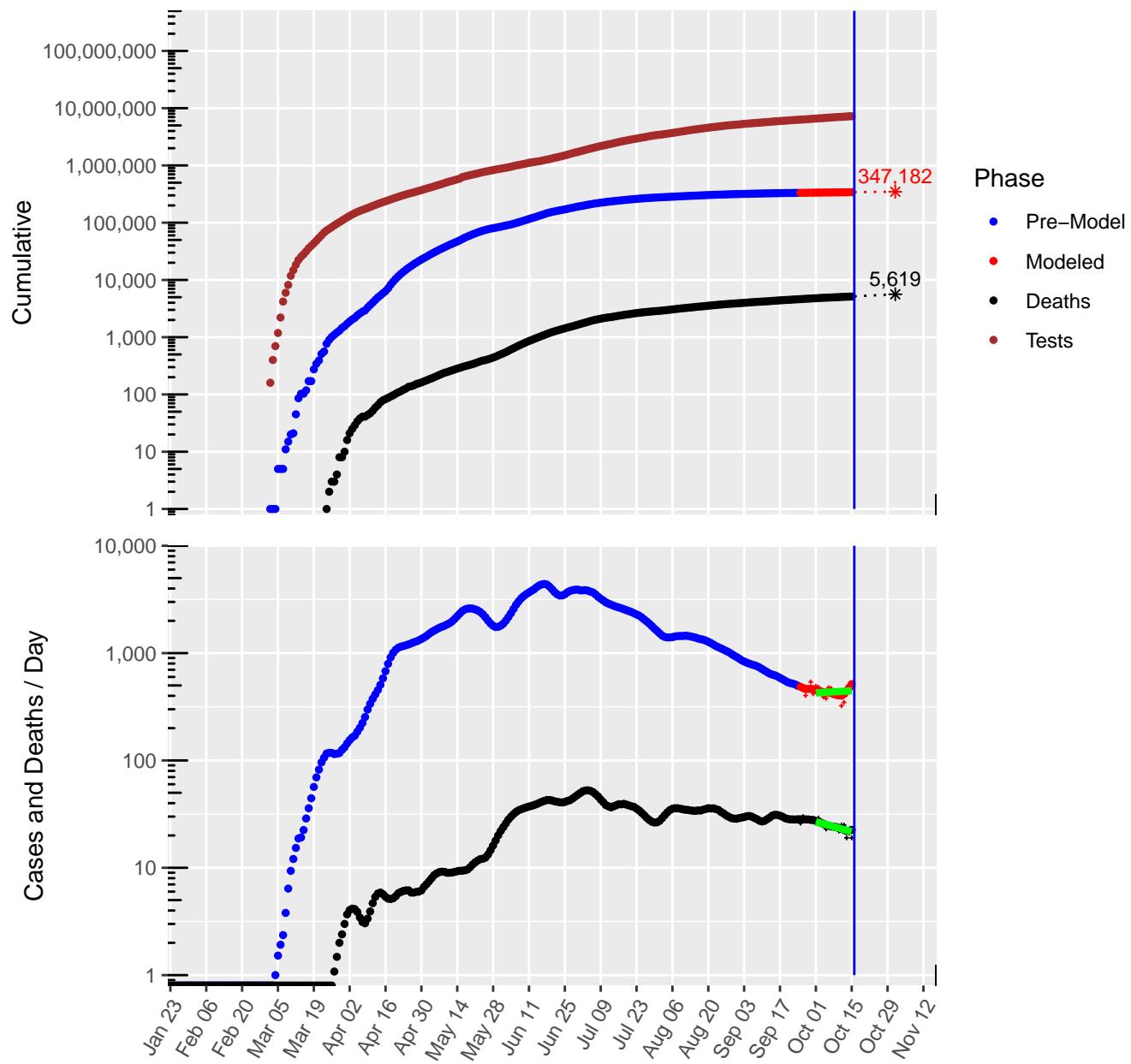


37) --- Deaths: 10,086 (65) --- Case Mortality: 2.4% --- Daily Change: -1.4% Cases, +0.1% Deaths

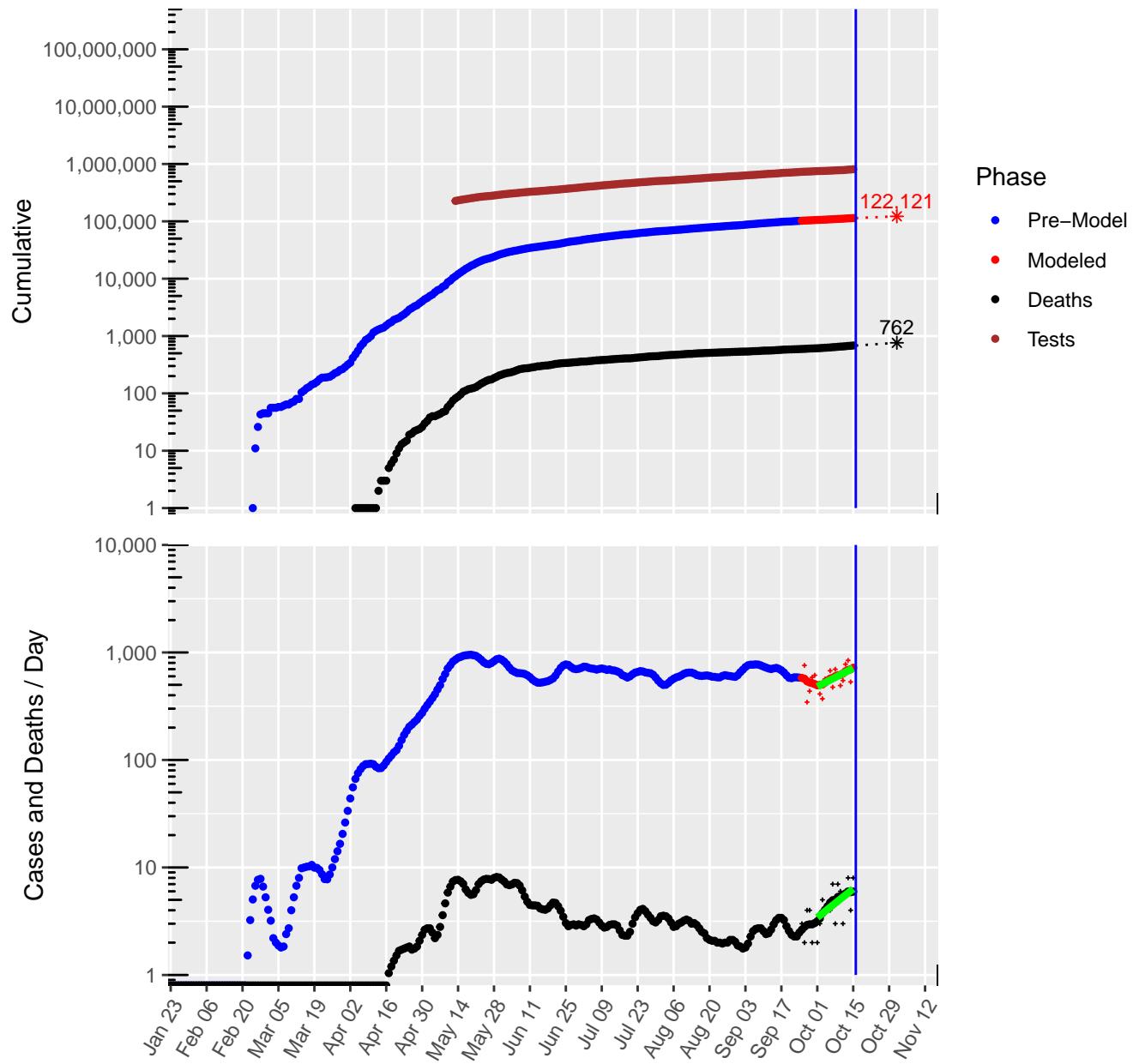
# Egypt projection as of 2020-10-16



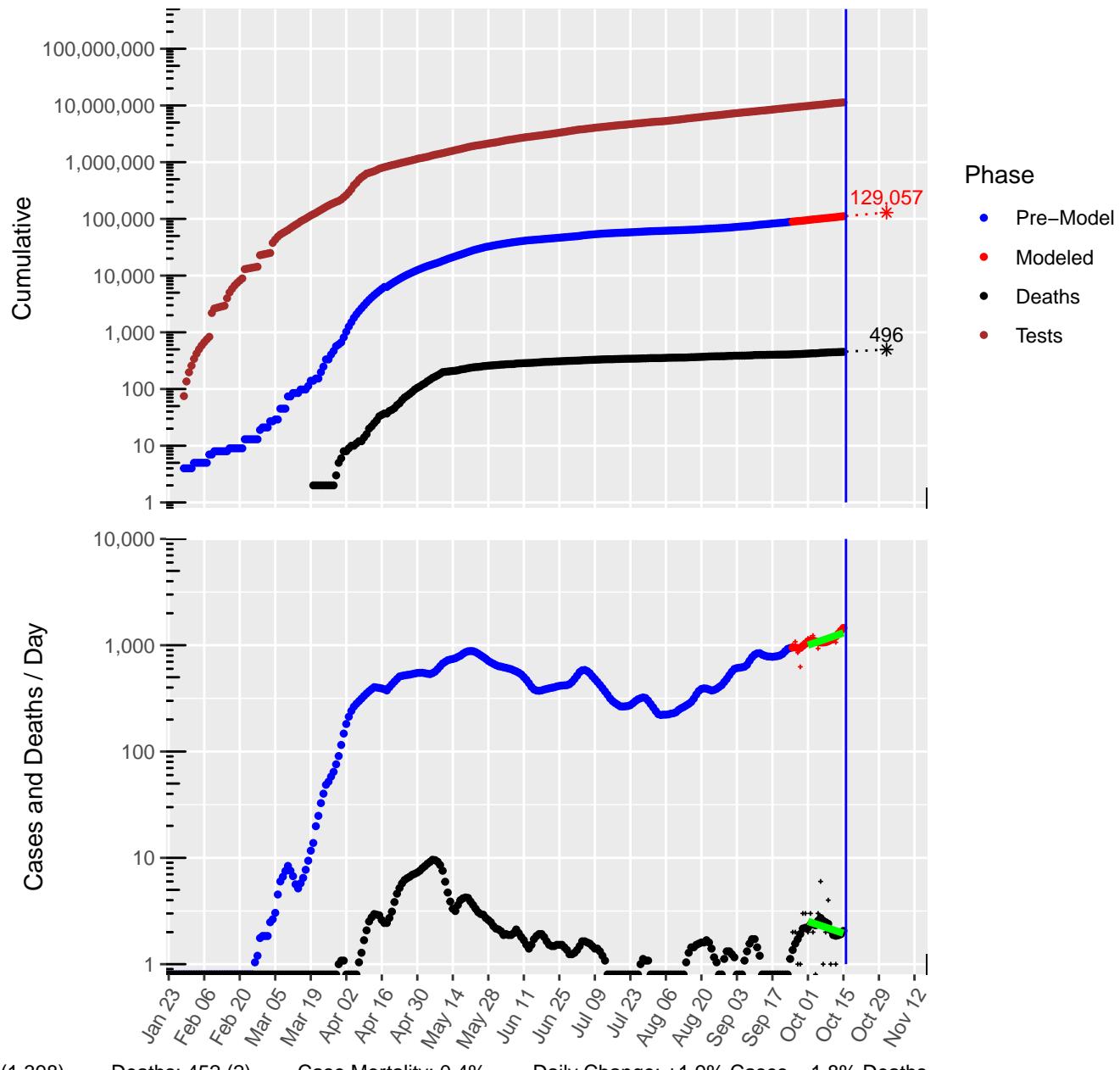
# Saudi Arabia projection as of 2020-10-16



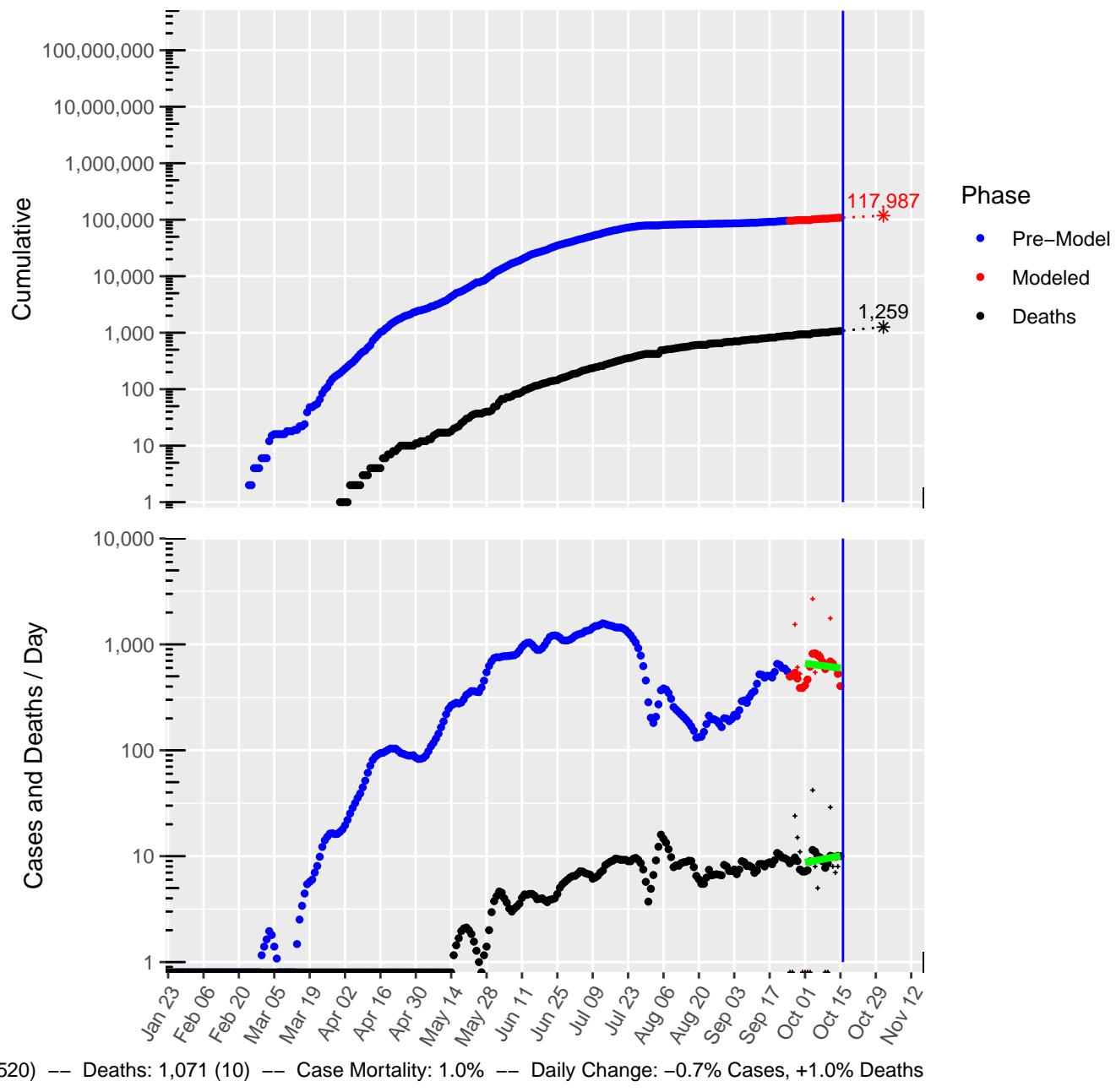
# Kuwait projection as of 2020-10-16



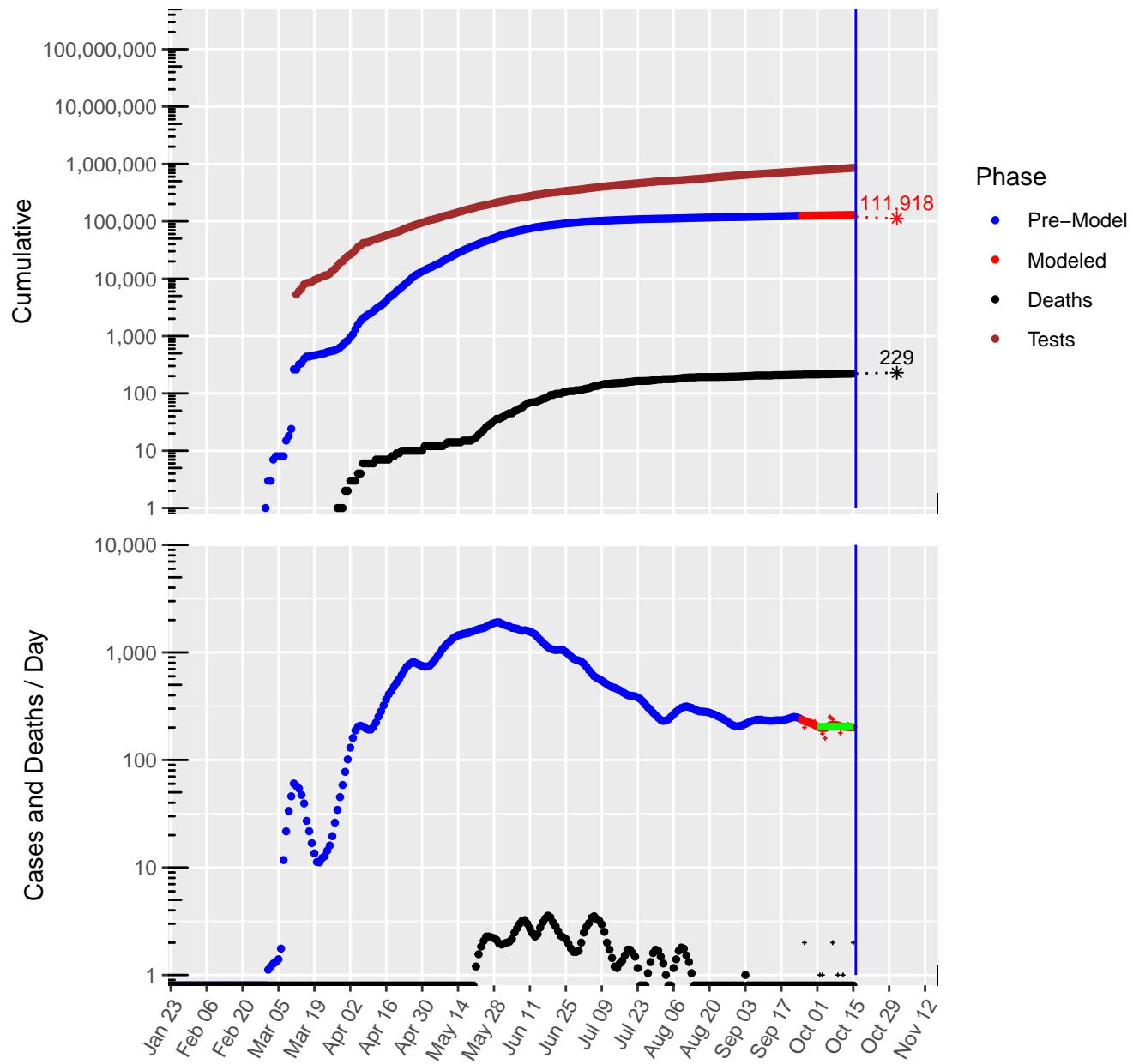
# United Arab Emirates projection as of 2020-10-16



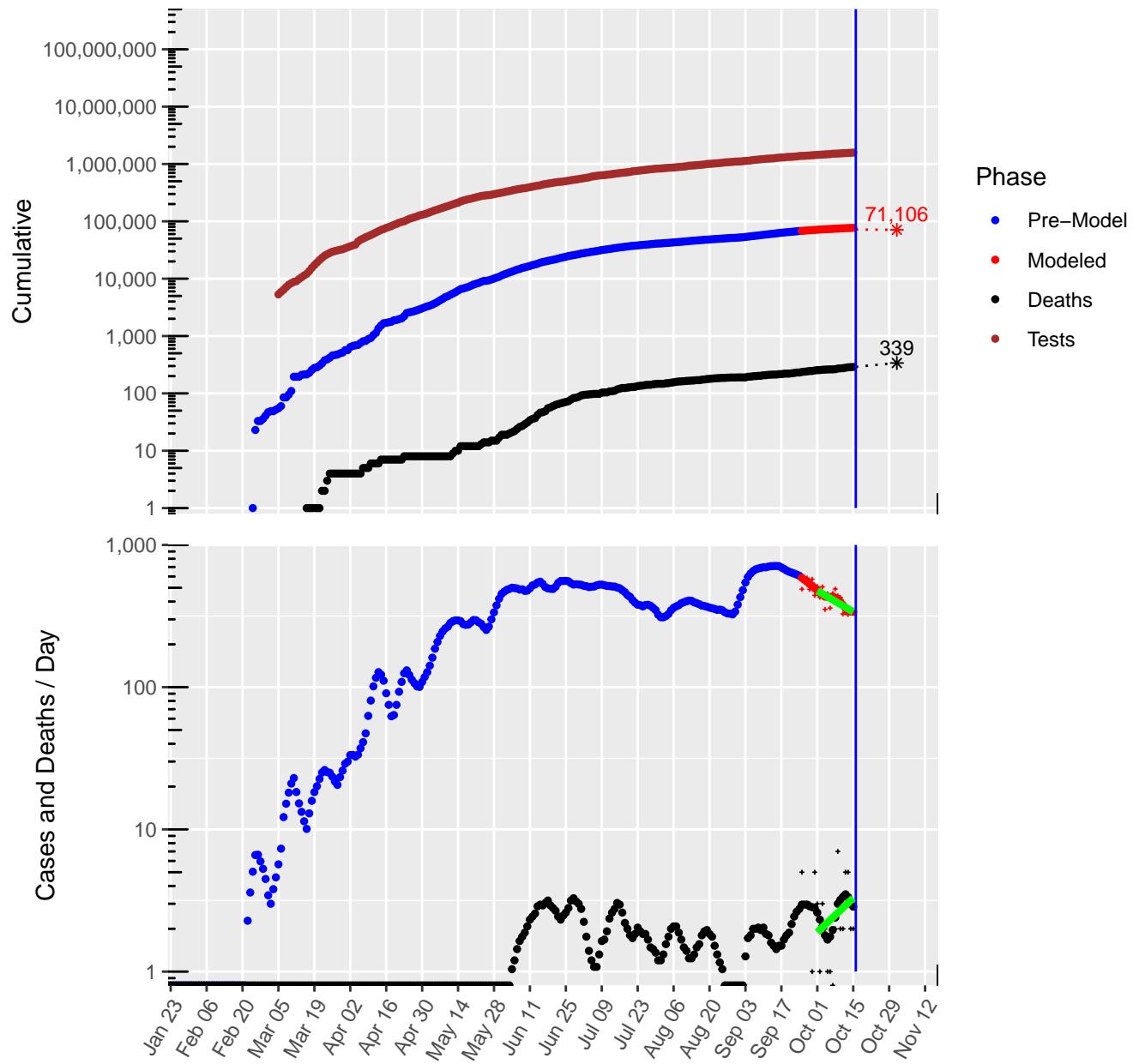
# Oman projection as of 2020-10-16



# Qatar projection as of 2020-10-16

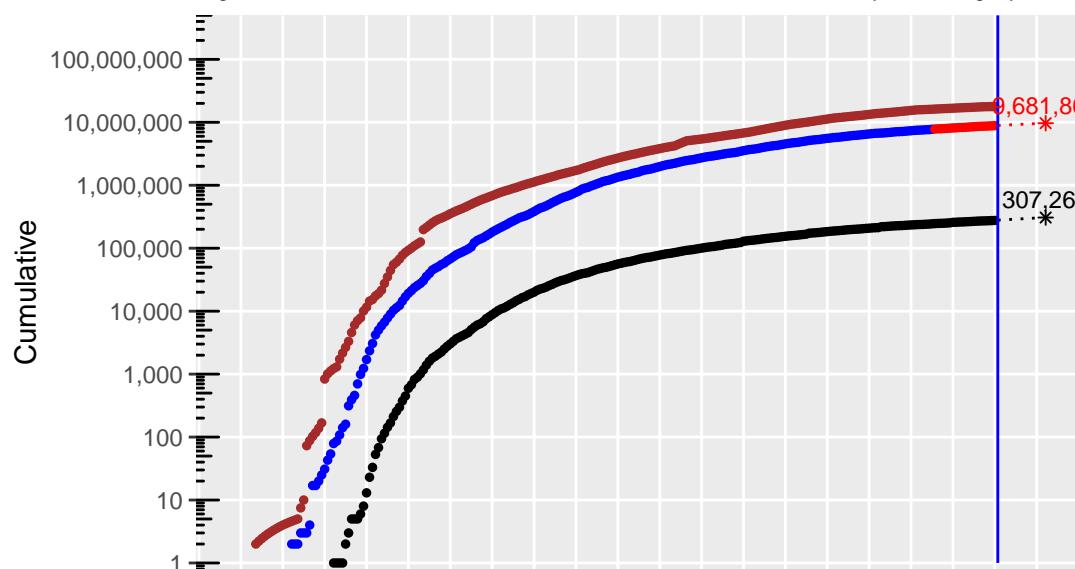


# Bahrain projection as of 2020-10-16

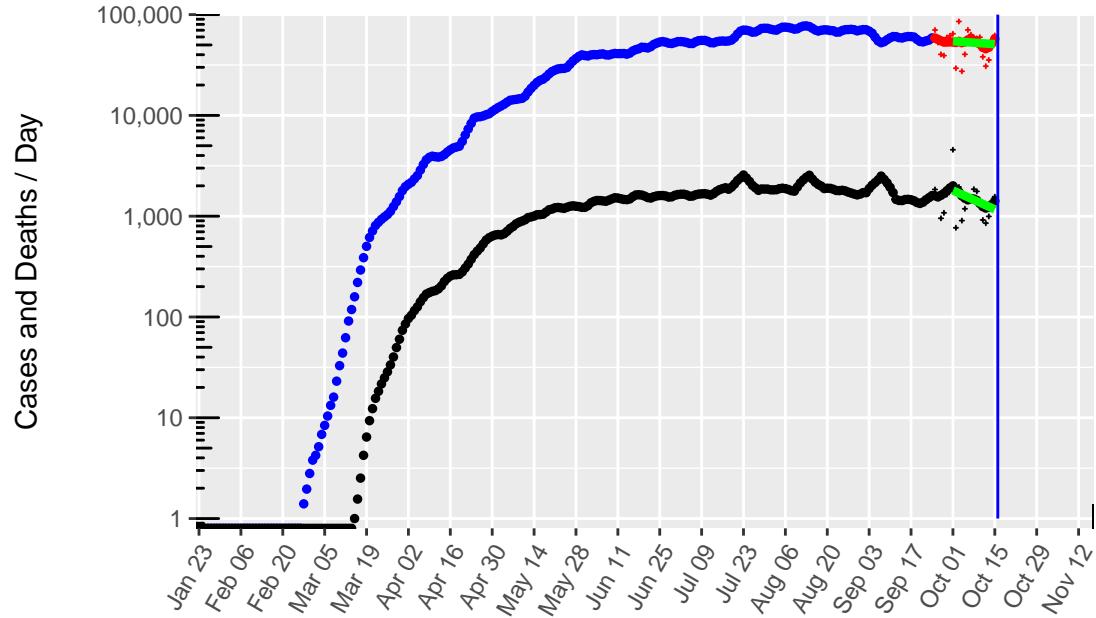


# South America projection as of 2020-10-16

Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela

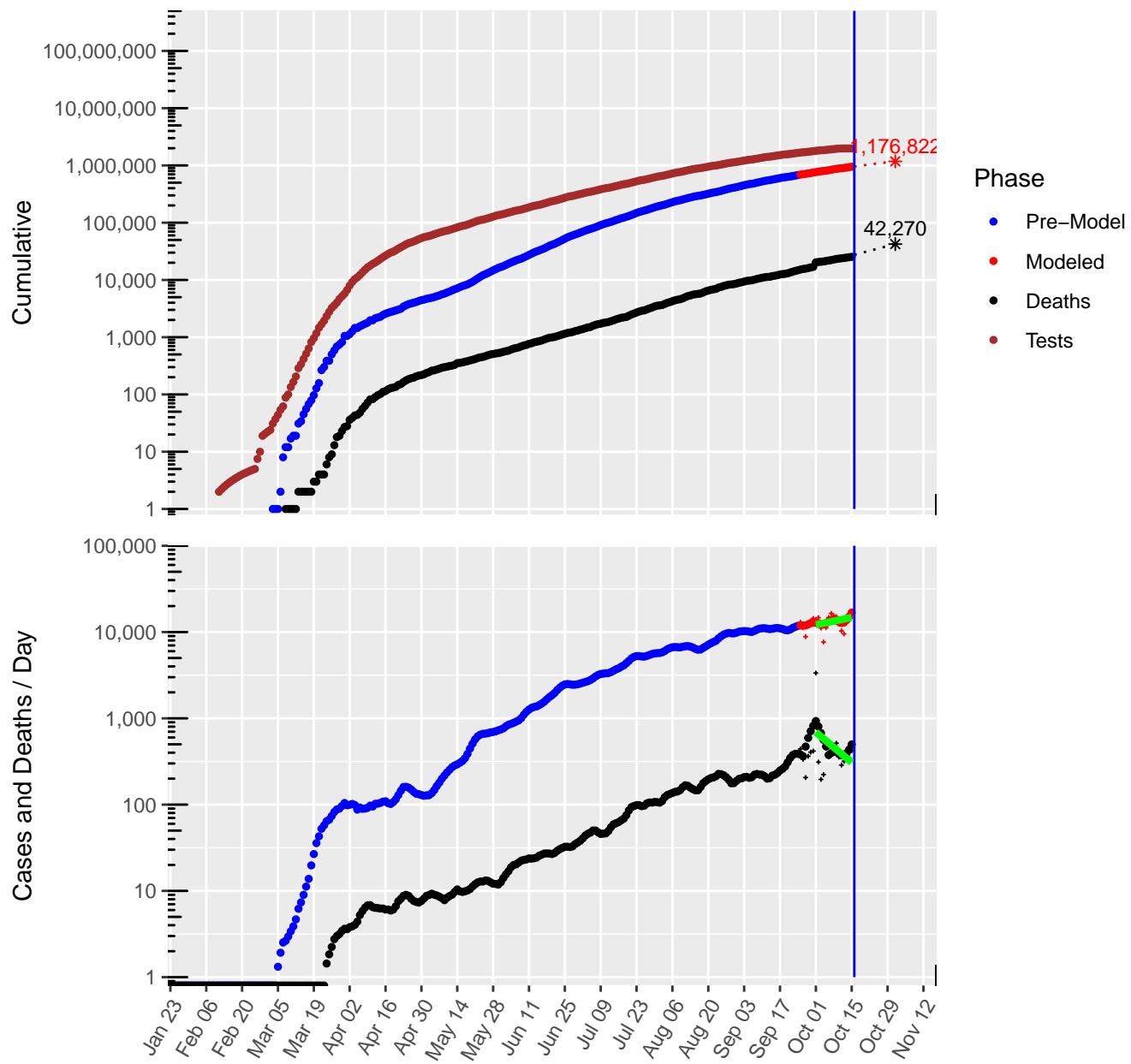


- Phase
- Pre-Model
  - Modeled
  - Deaths
  - Tests

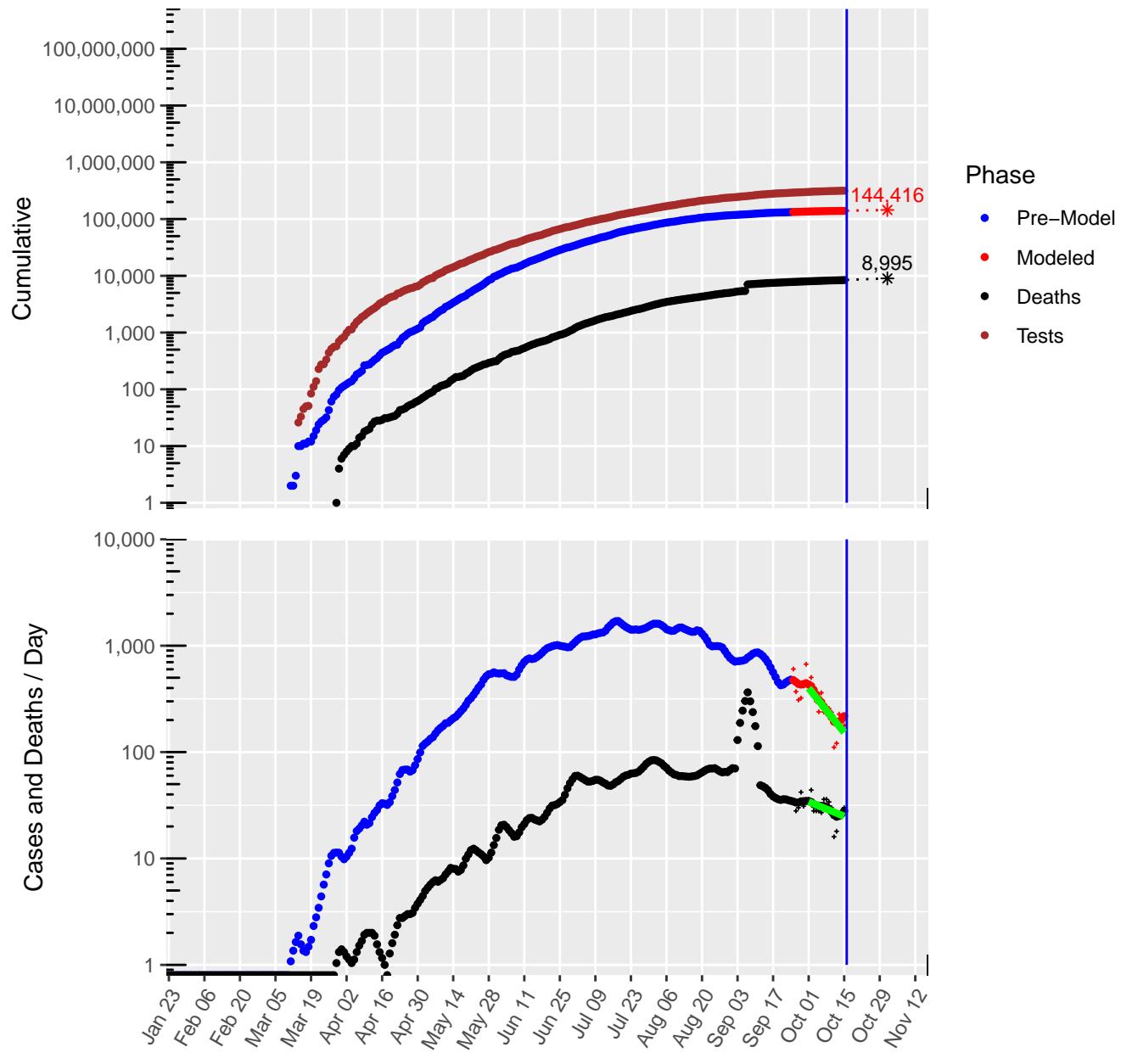


— Deaths: 276,189 (1,561) — Case Mortality: 3.1% — Daily Change: -0.5% Cases, -3.0% Deaths

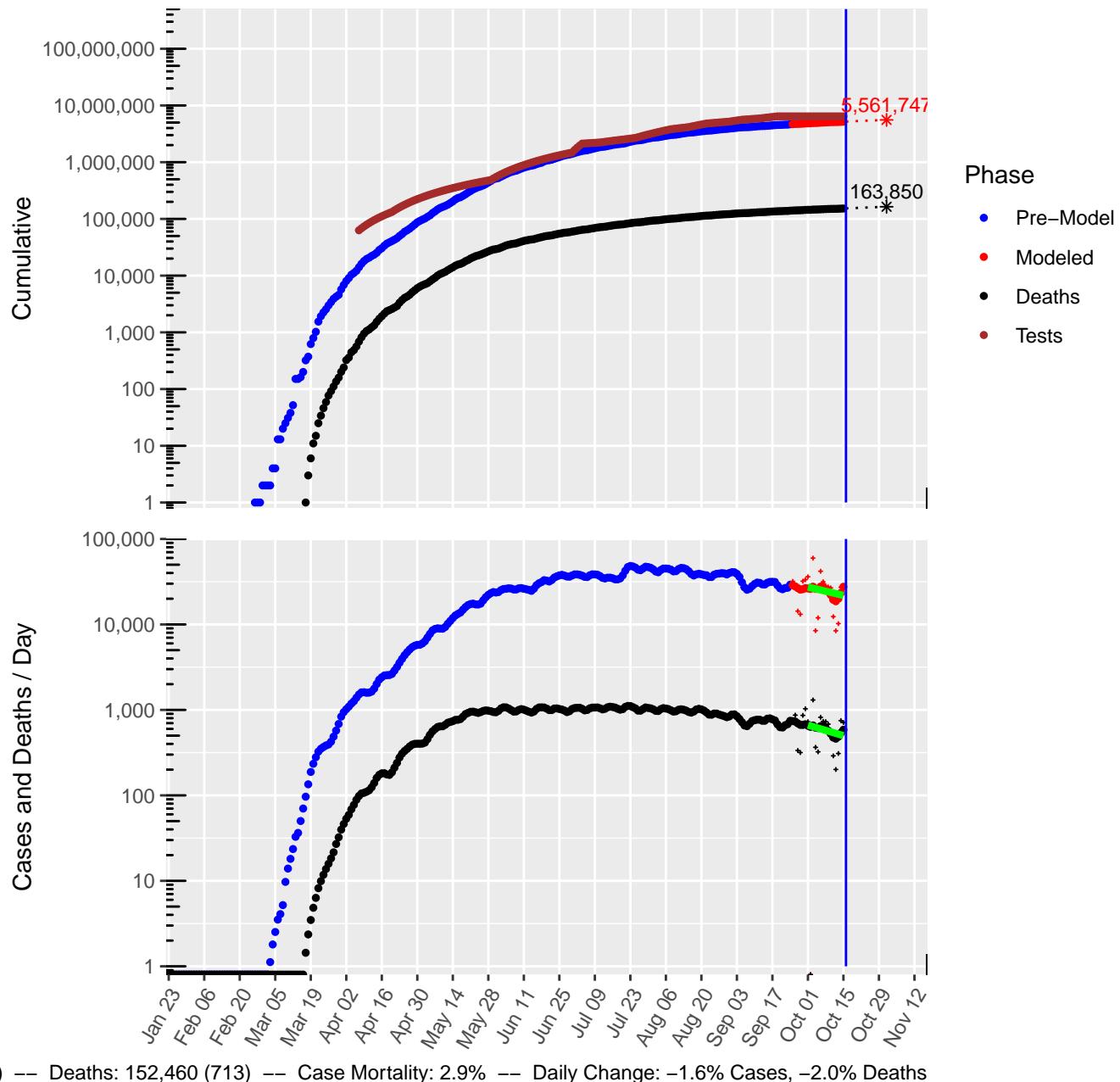
# Argentina projection as of 2020-10-16



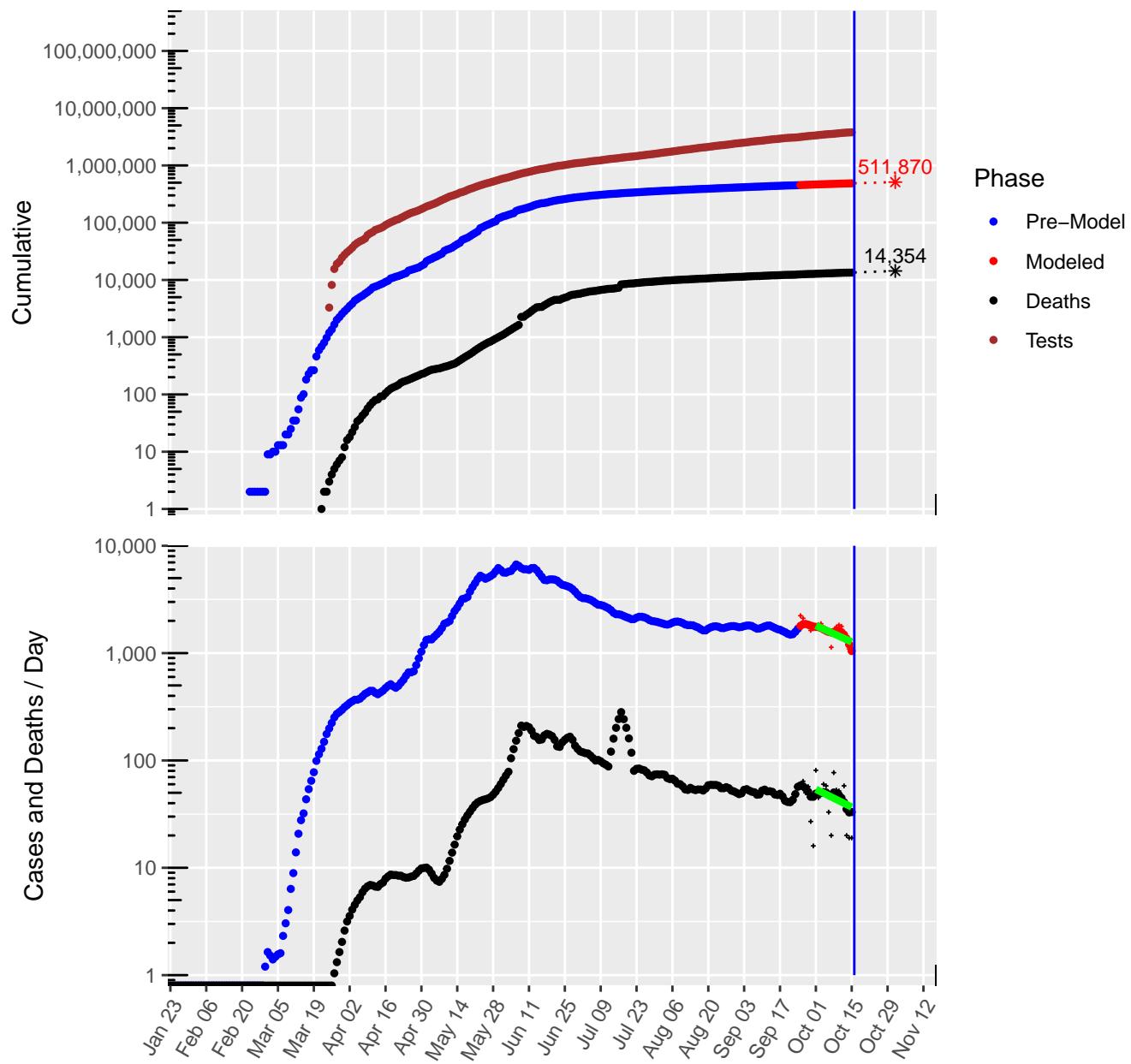
# Bolivia projection as of 2020-10-16



# Brazil projection as of 2020-10-16

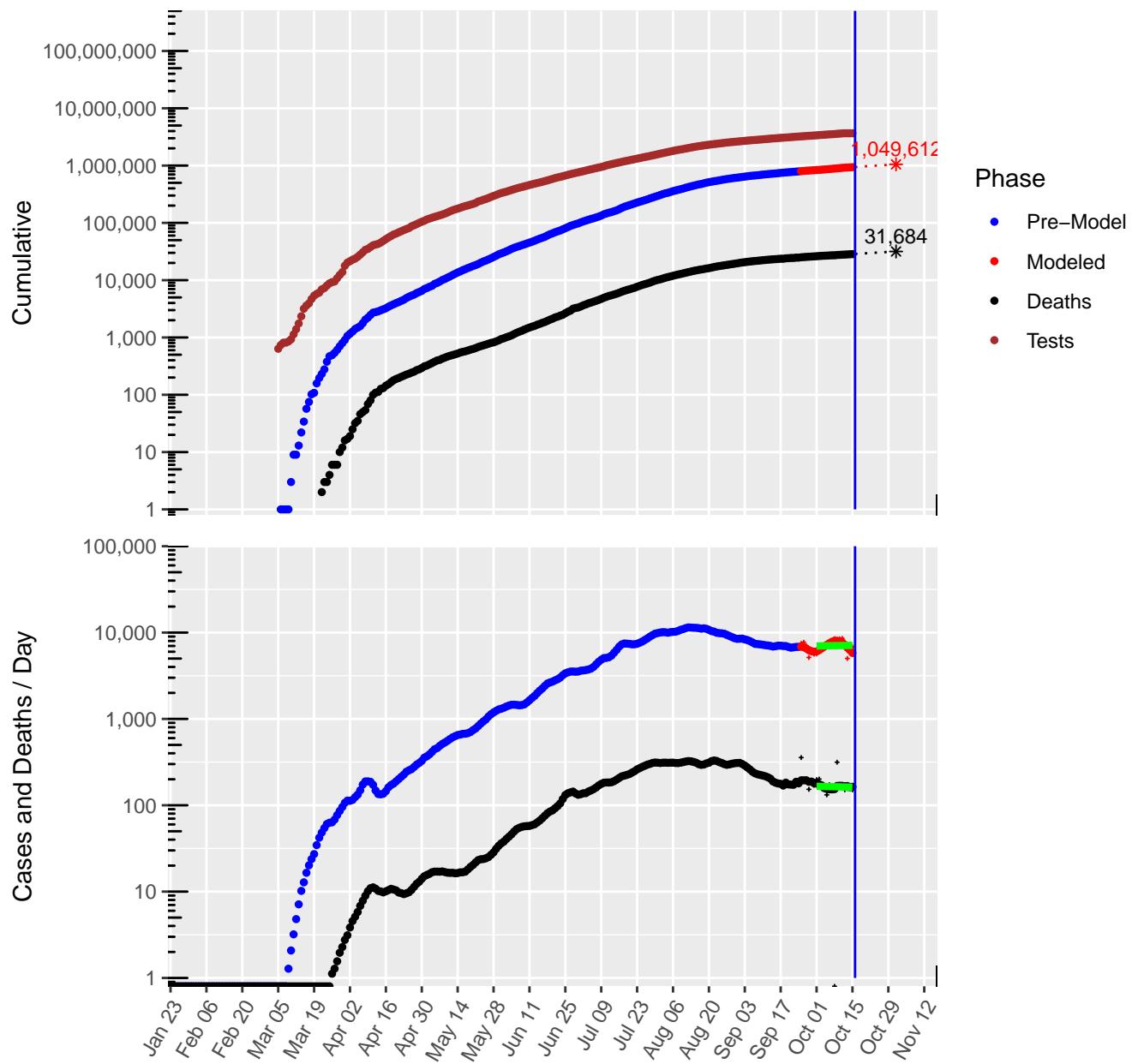


# Chile projection as of 2020-10-16

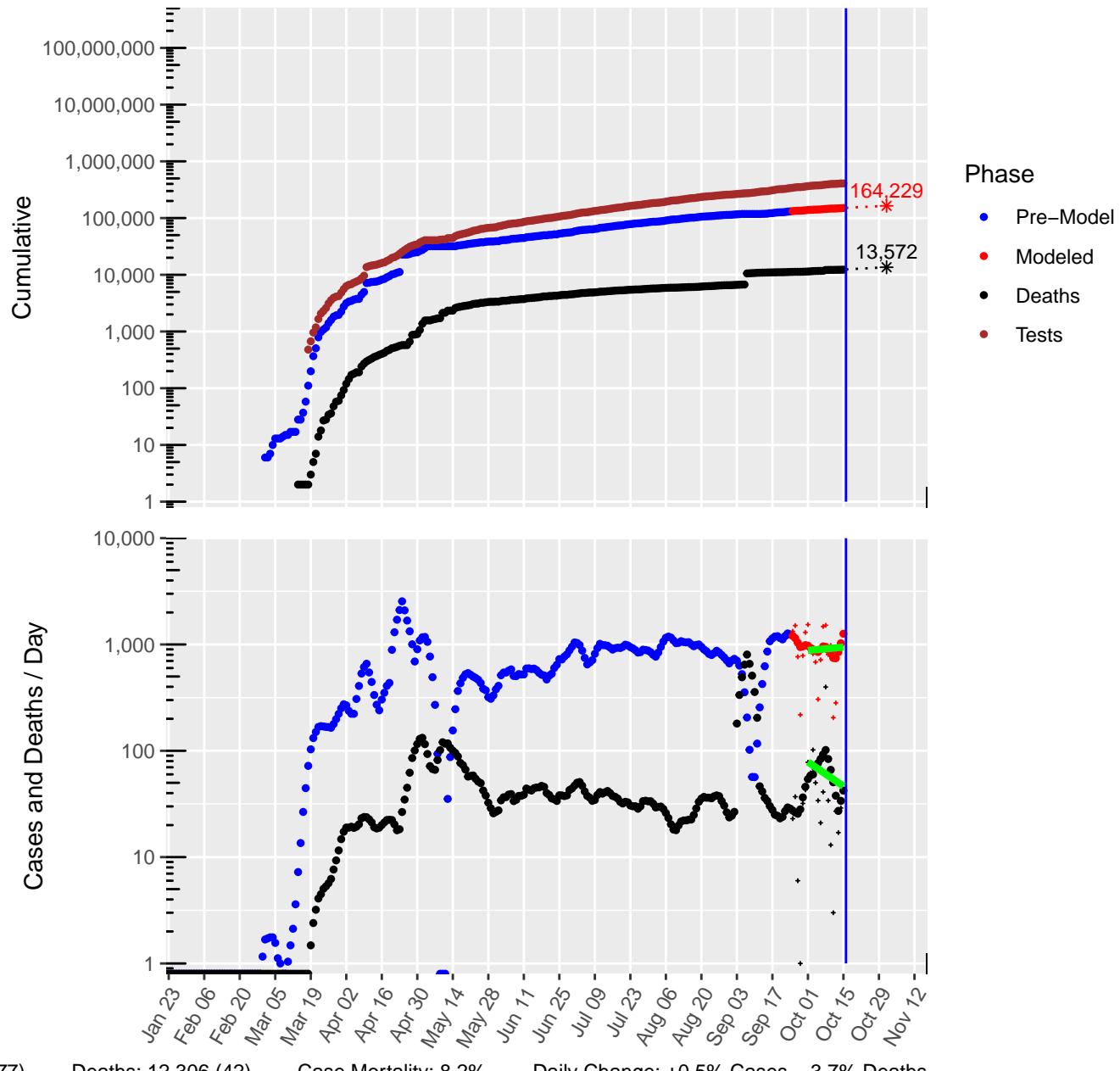


24) --- Deaths: 13,434 (19) --- Case Mortality: 2.8% --- Daily Change: -2.5% Cases, -2.7% Deaths

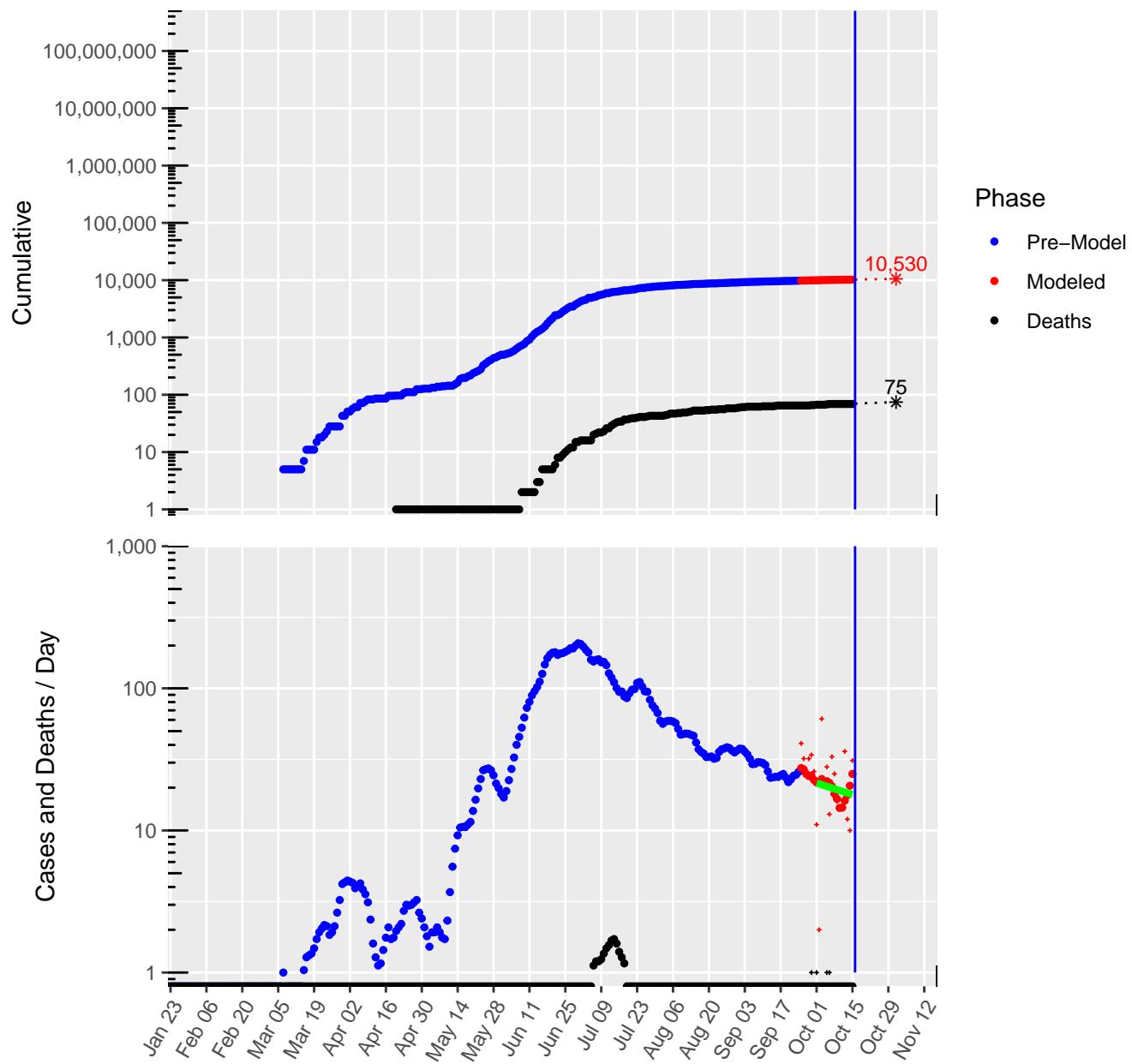
# Colombia projection as of 2020-10-16



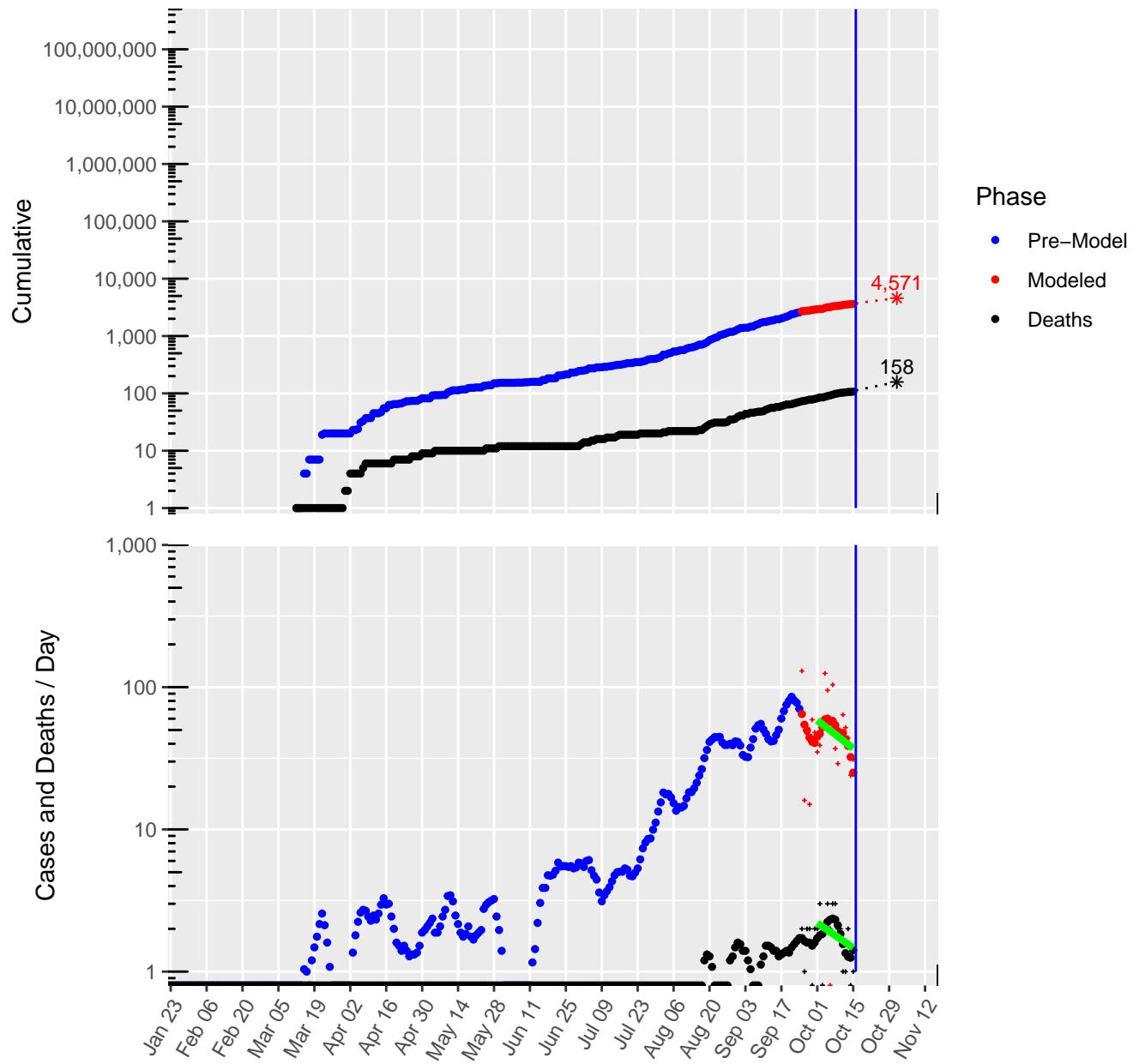
# Ecuador projection as of 2020-10-16



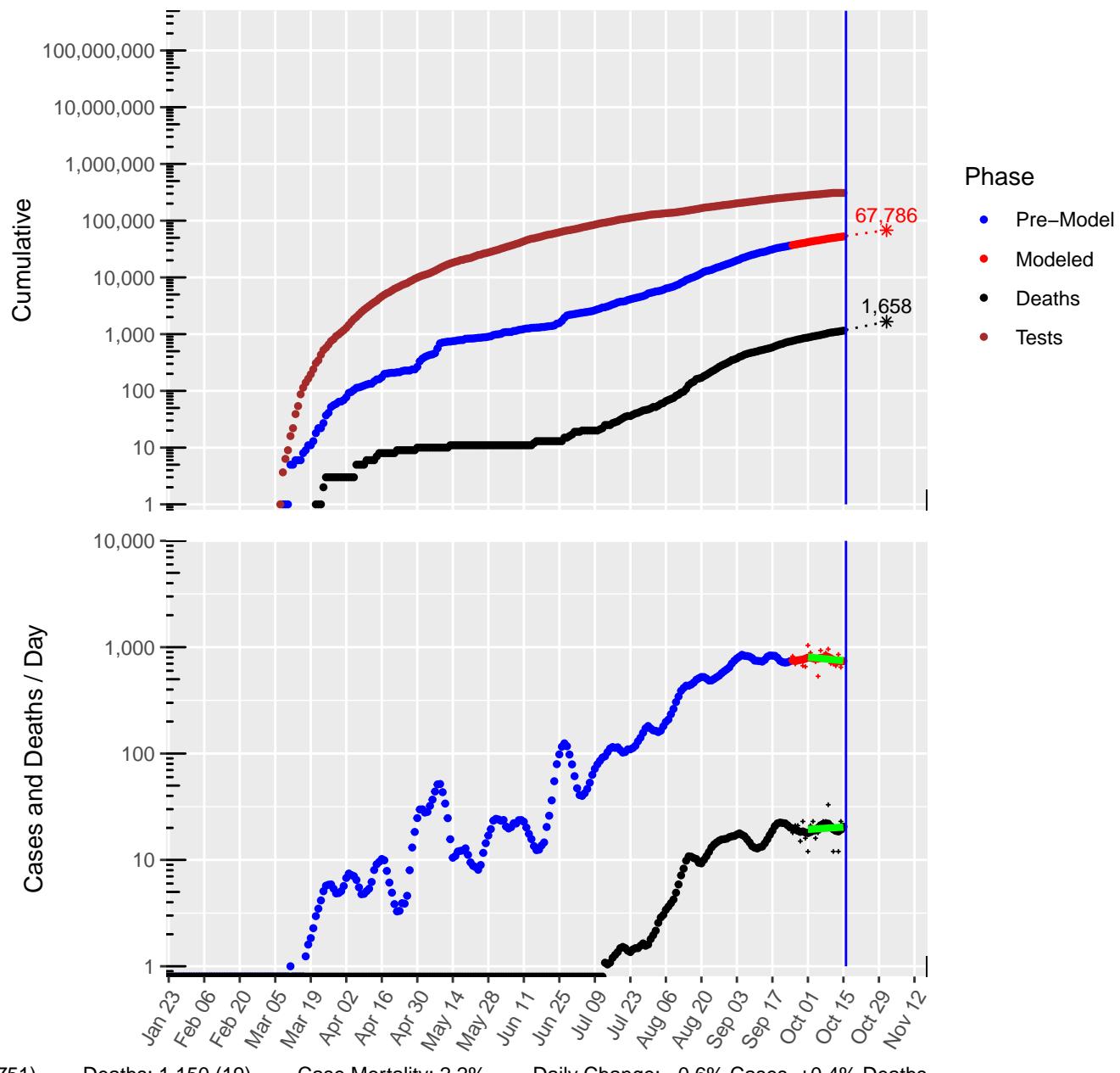
# French Guiana projection as of 2020-10-16



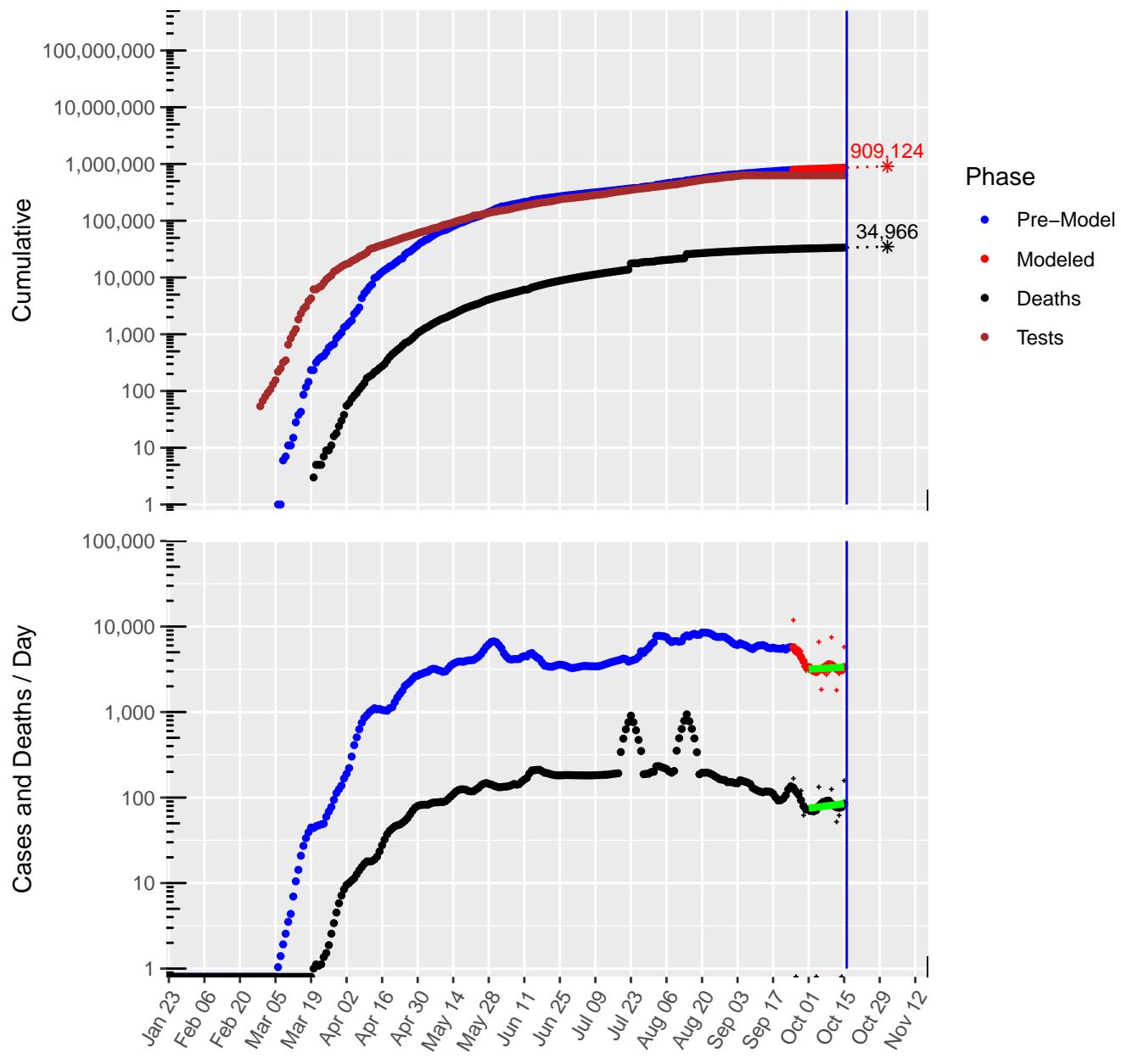
# Guyana projection as of 2020-10-16



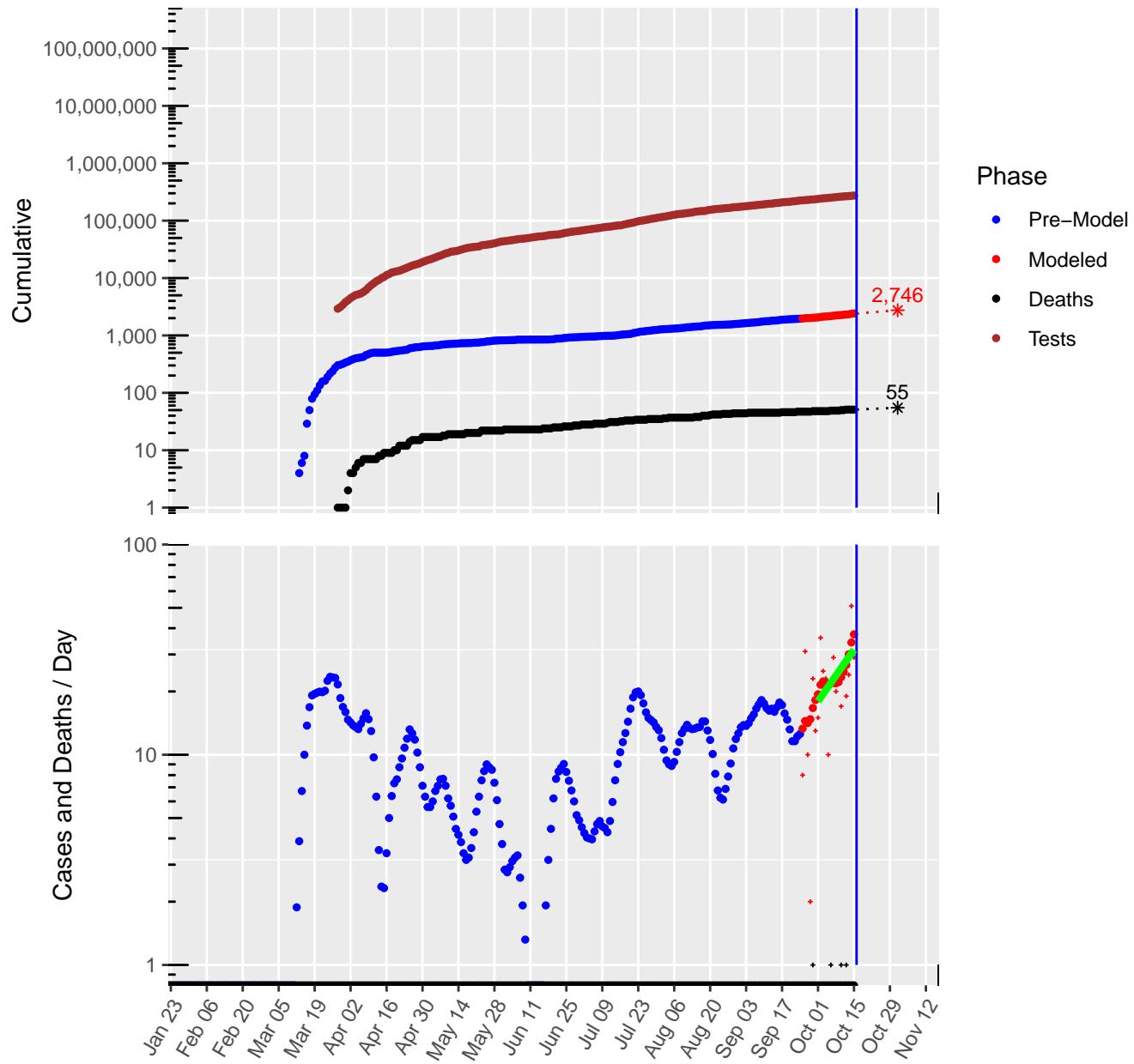
# Paraguay projection as of 2020-10-16



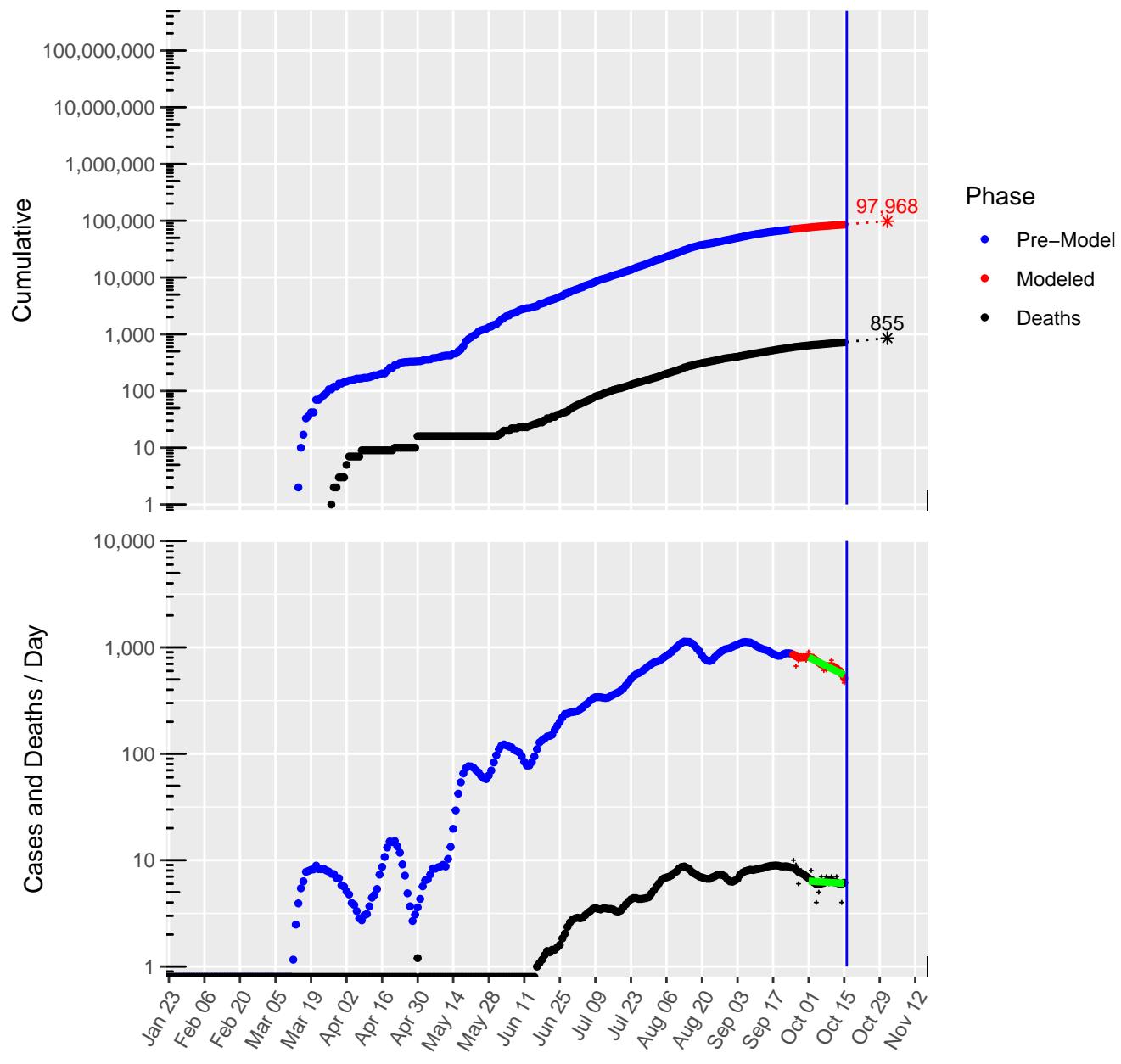
# Peru projection as of 2020-10-16



# Uruguay projection as of 2020-10-16

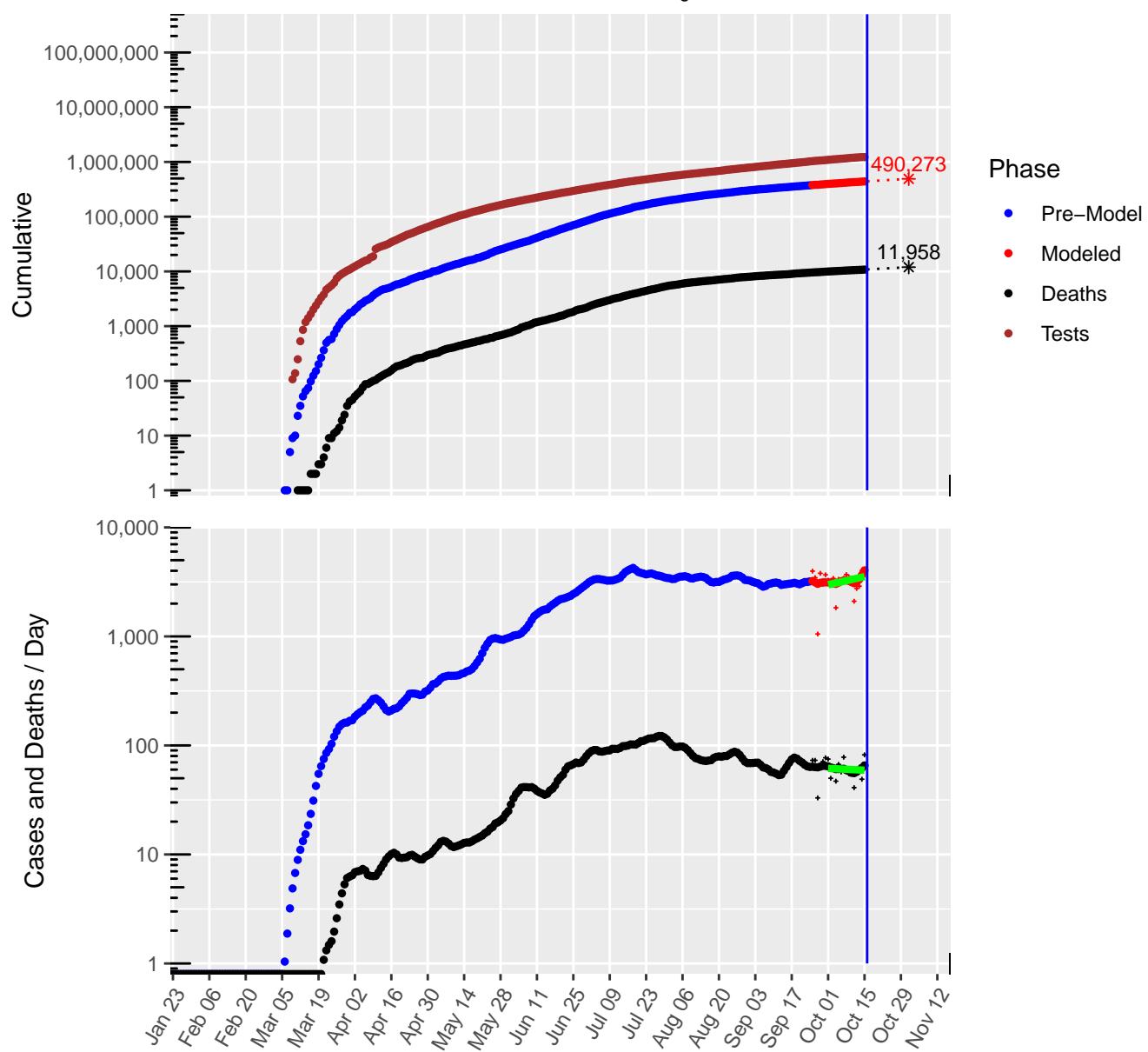


# Venezuela projection as of 2020-10-16

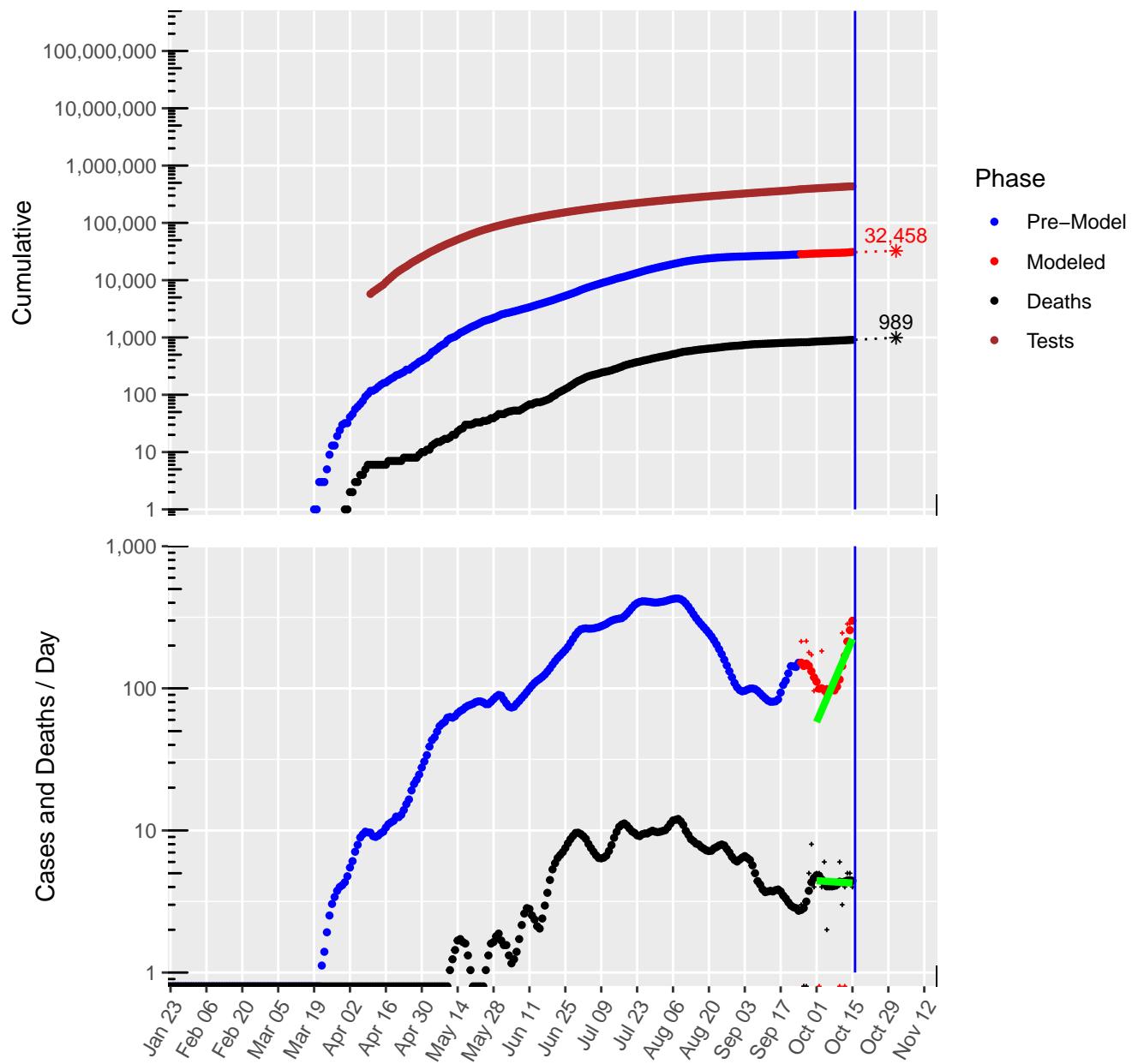


# Central America projection as of 2020-10-16

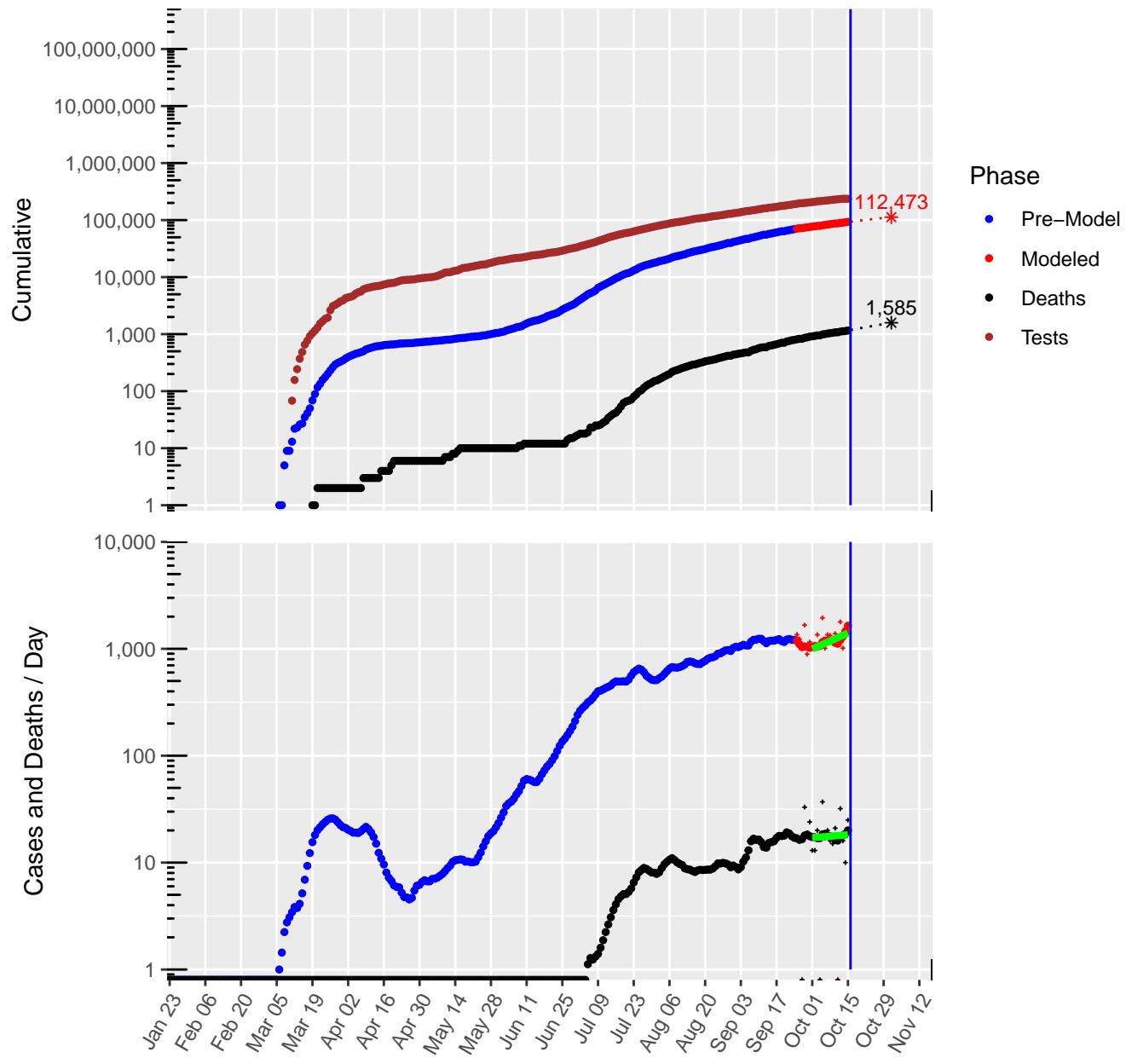
El Salvador, Costa Rica, Belize, Guatemala, Honduras, Nicaragua, and Panama



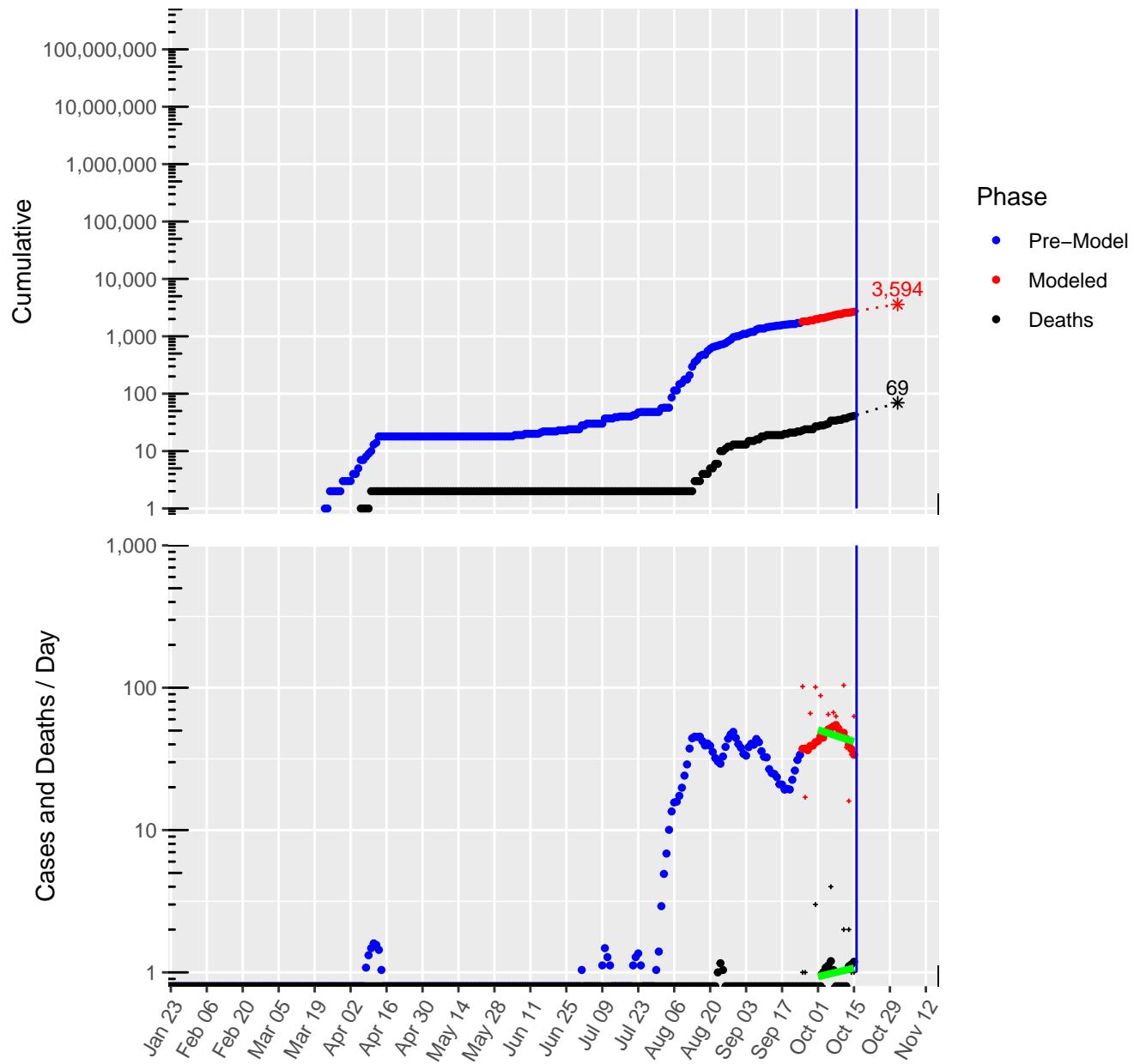
# El Salvador projection as of 2020-10-16



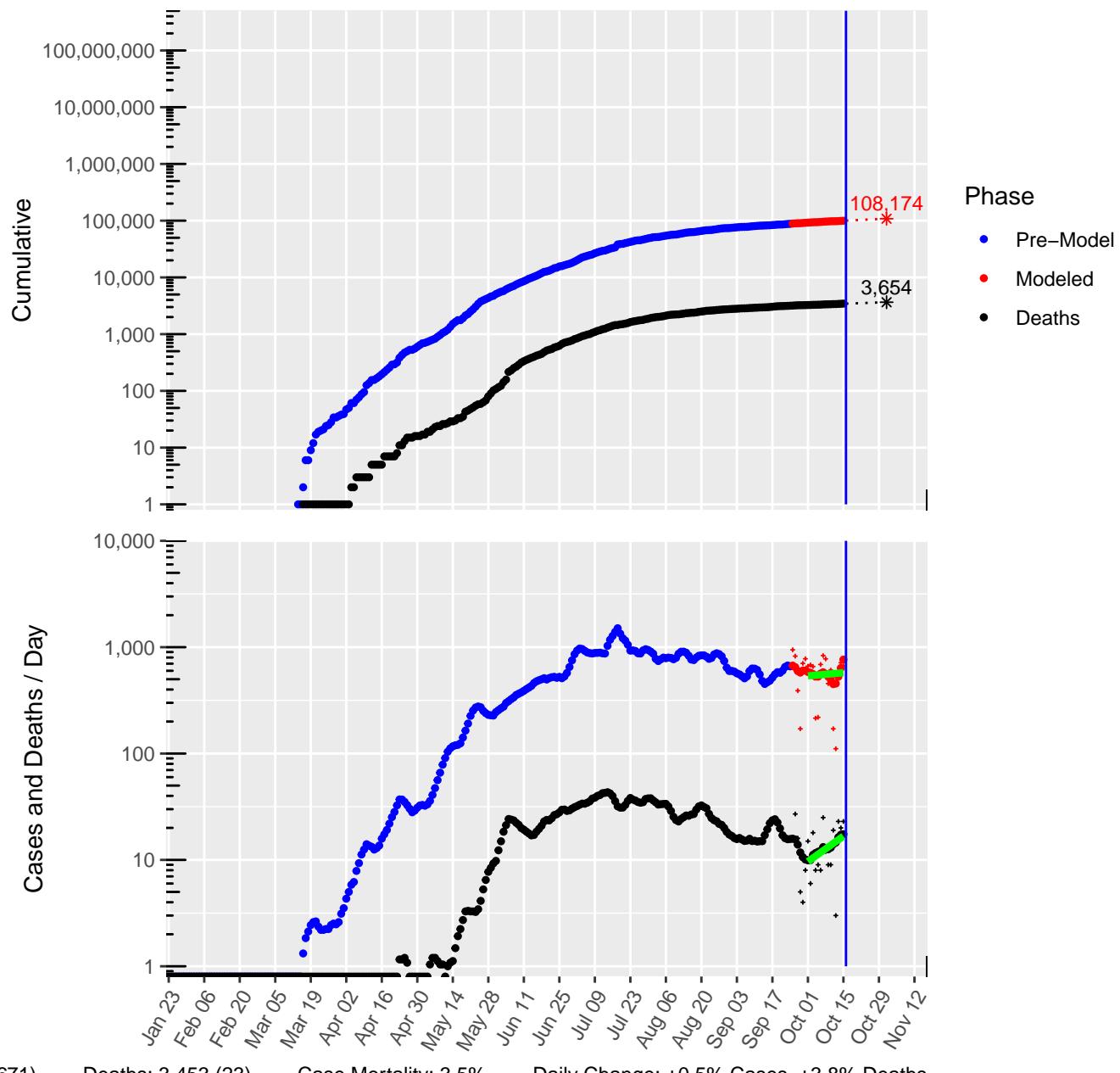
# Costa Rica projection as of 2020-10-16



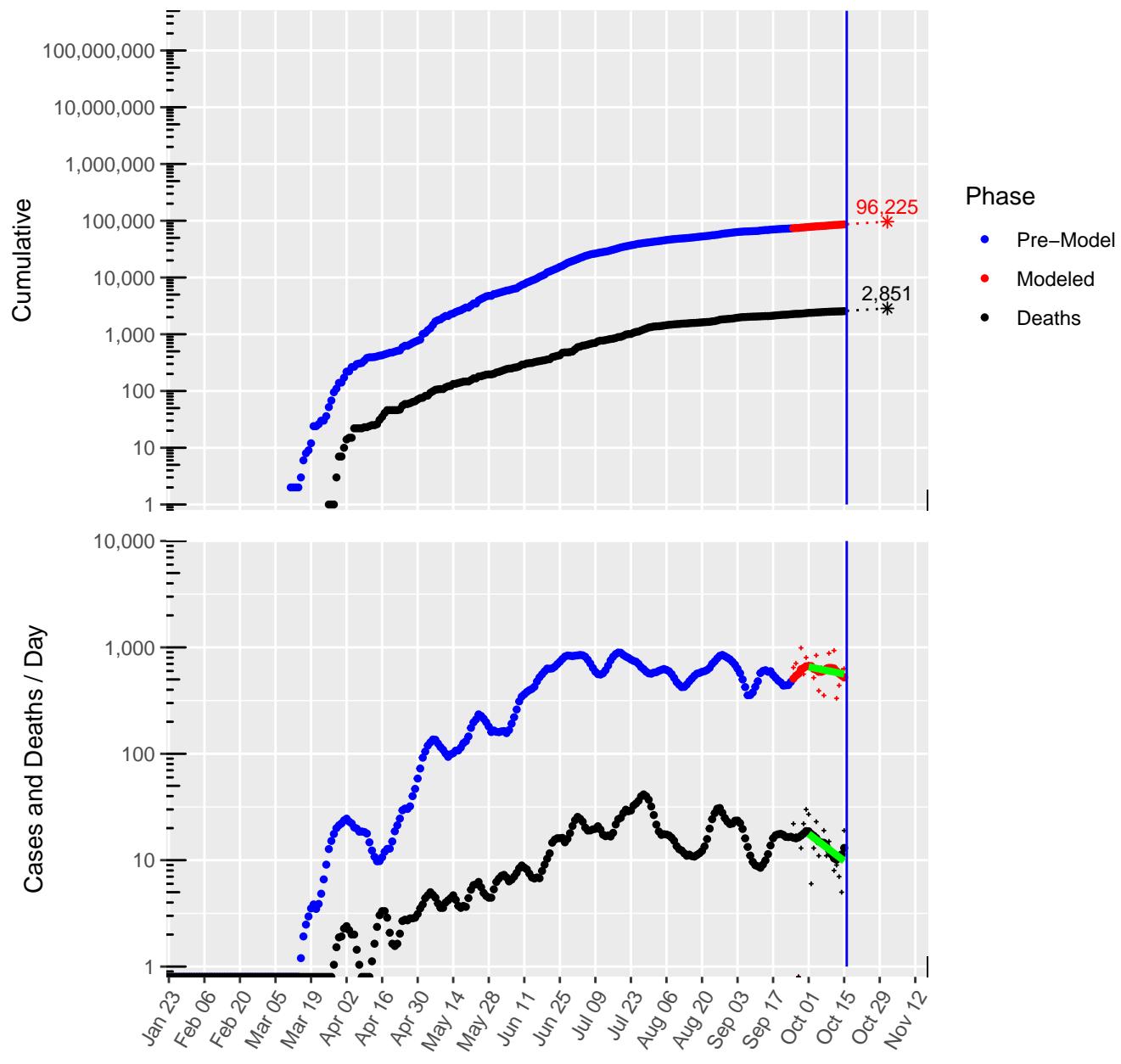
# Belize projection as of 2020-10-16



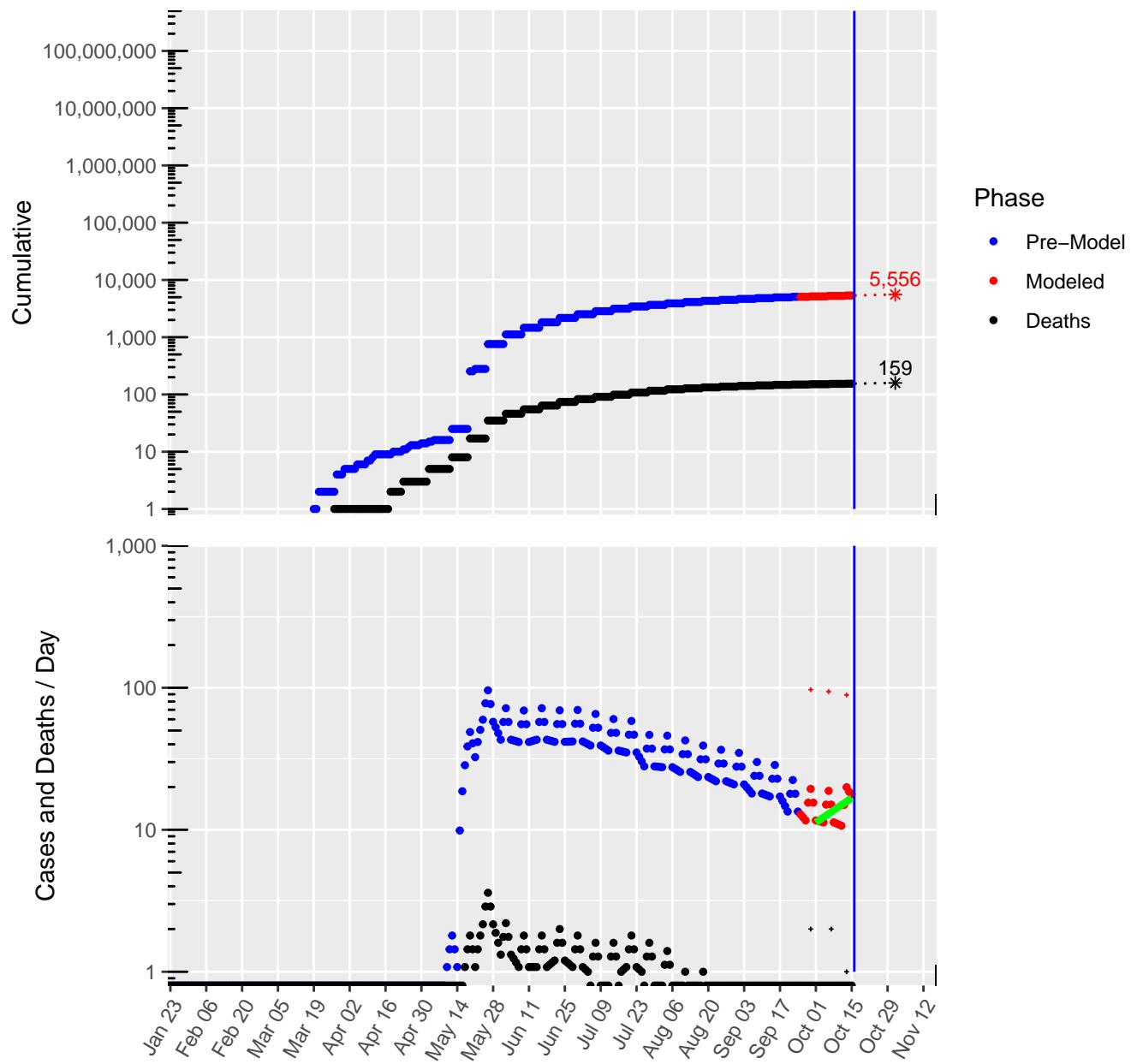
# Guatemala projection as of 2020-10-16



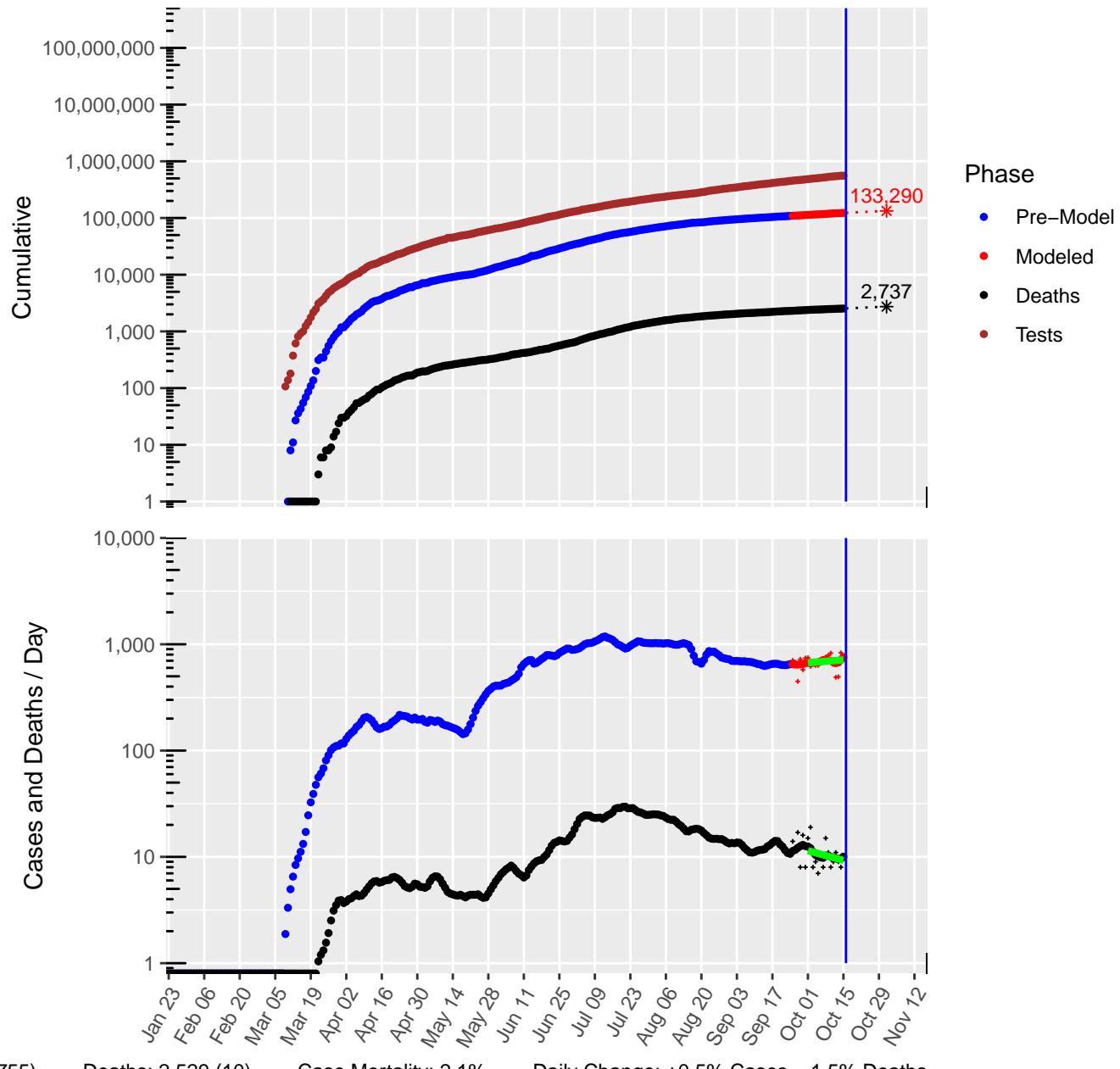
# Honduras projection as of 2020-10-16



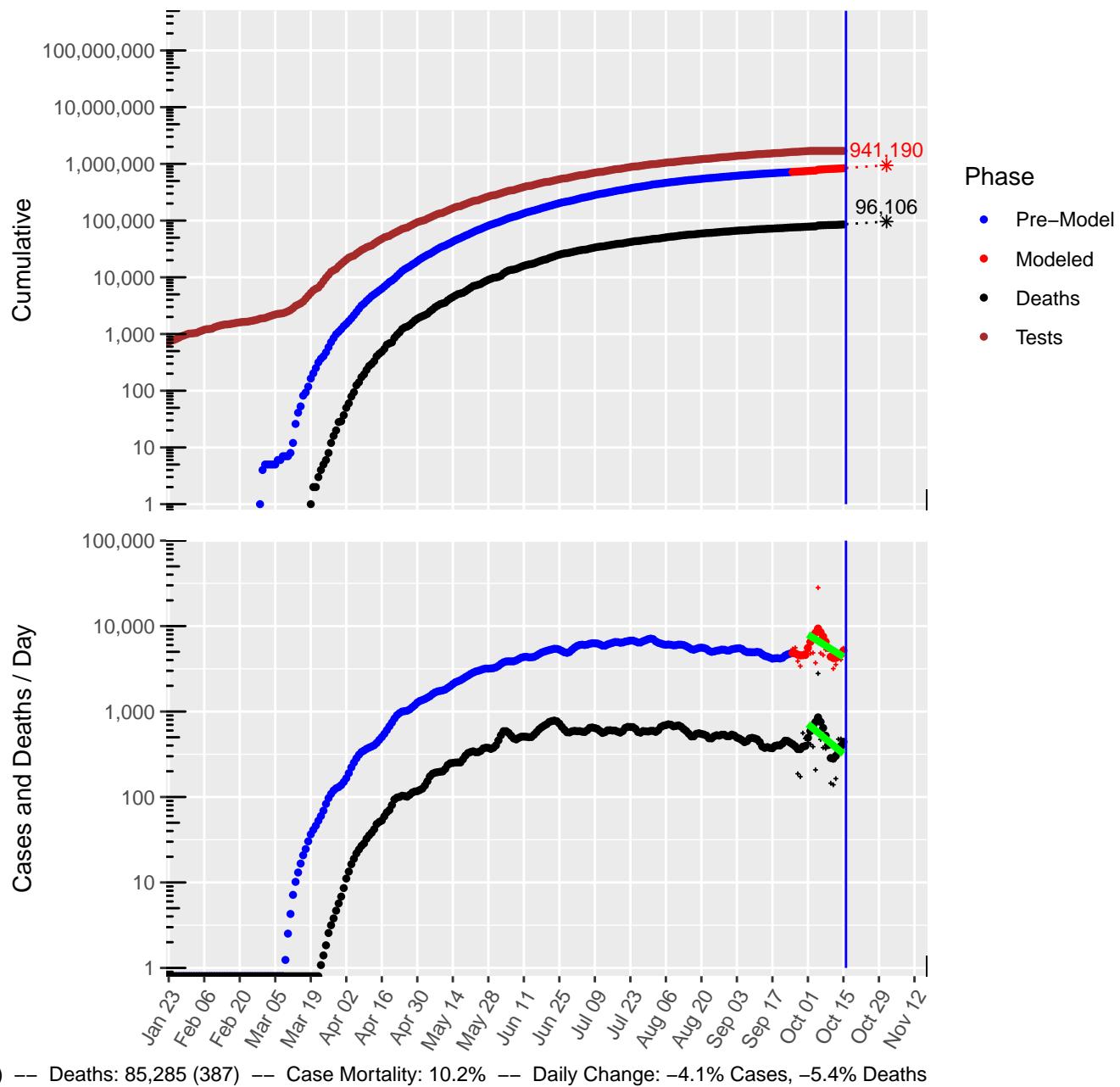
# Nicaragua projection as of 2020-10-16



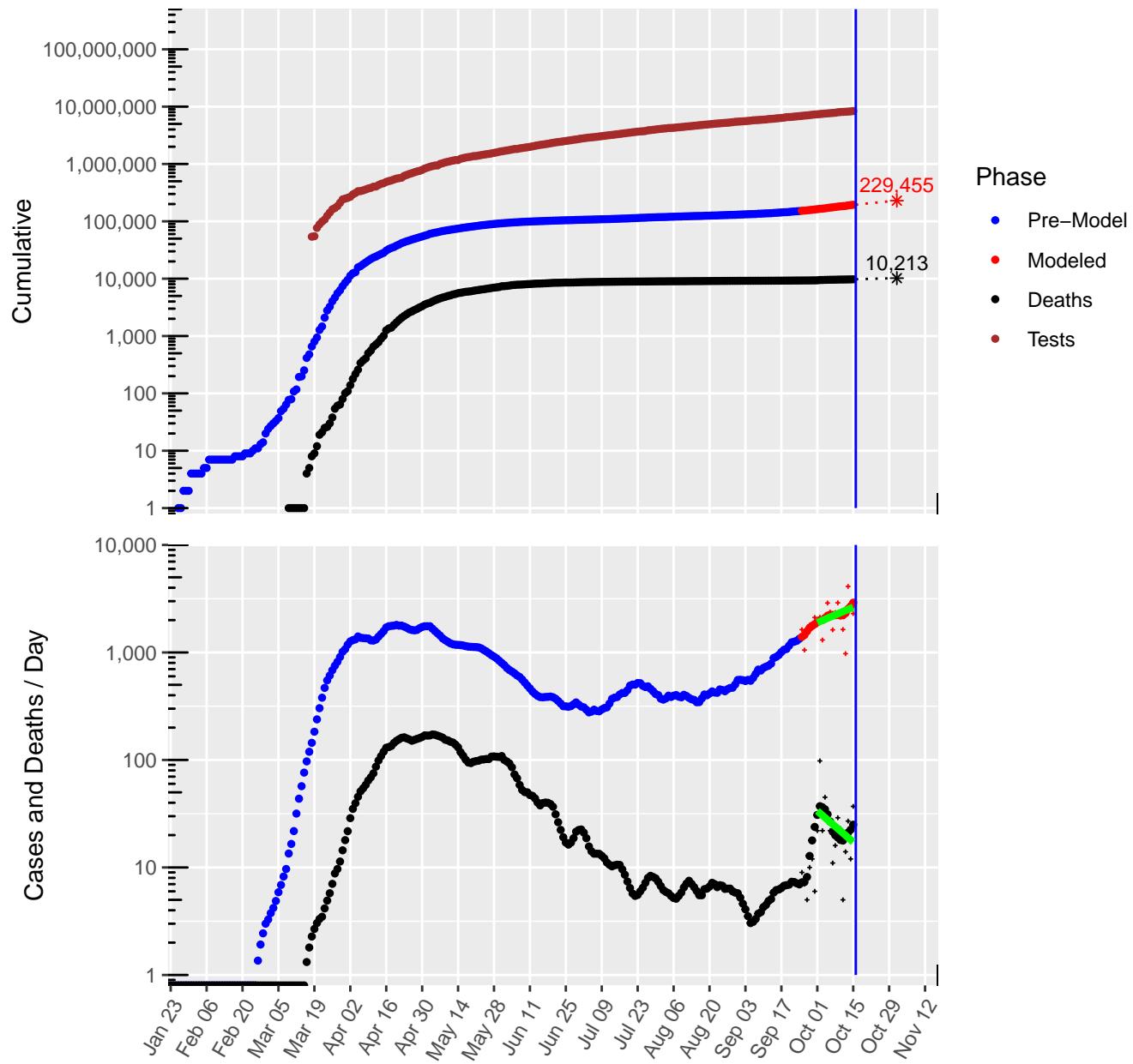
# Panama projection as of 2020-10-16



# Mexico projection as of 2020-10-16

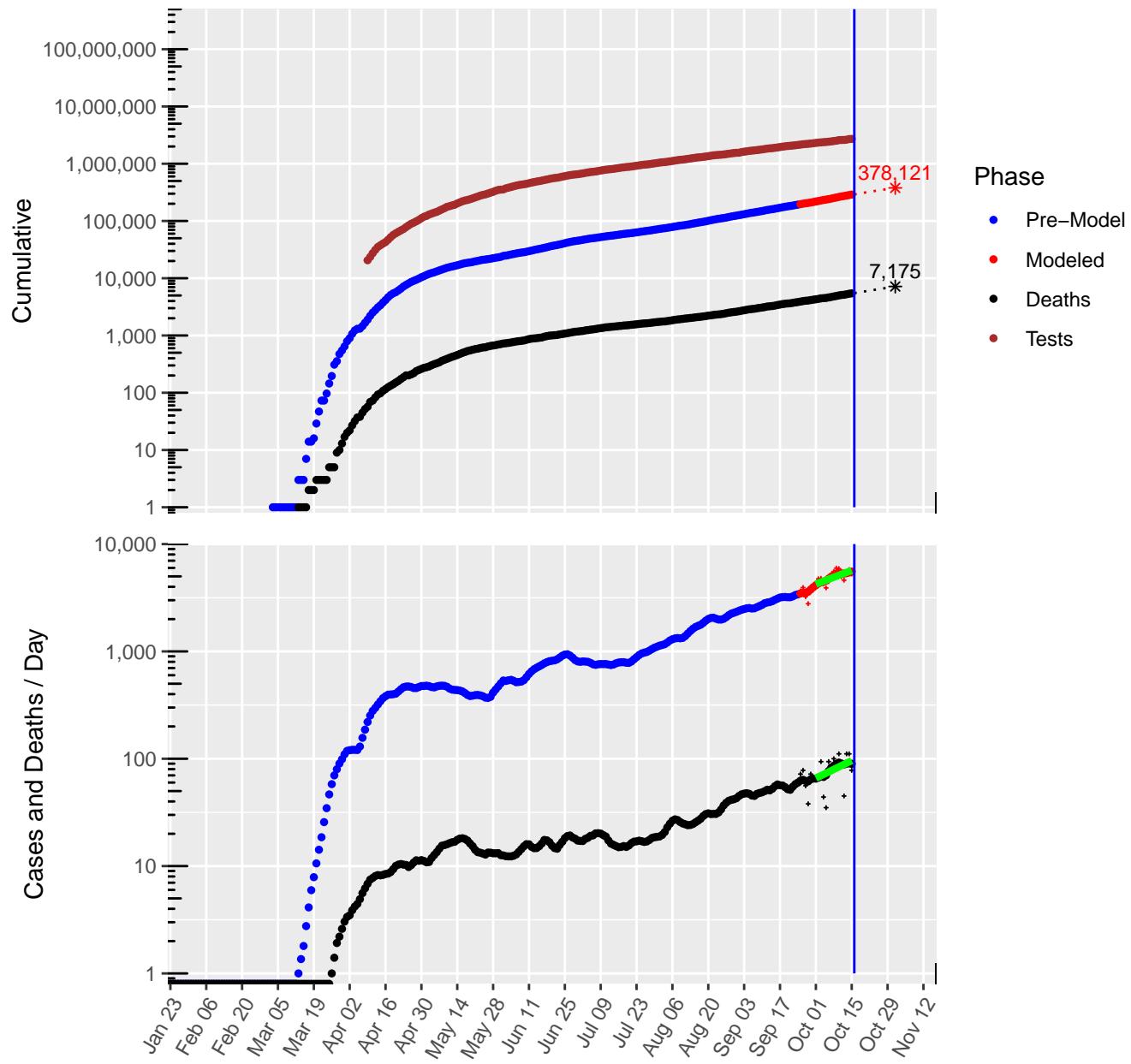


# Canada projection as of 2020-10-16

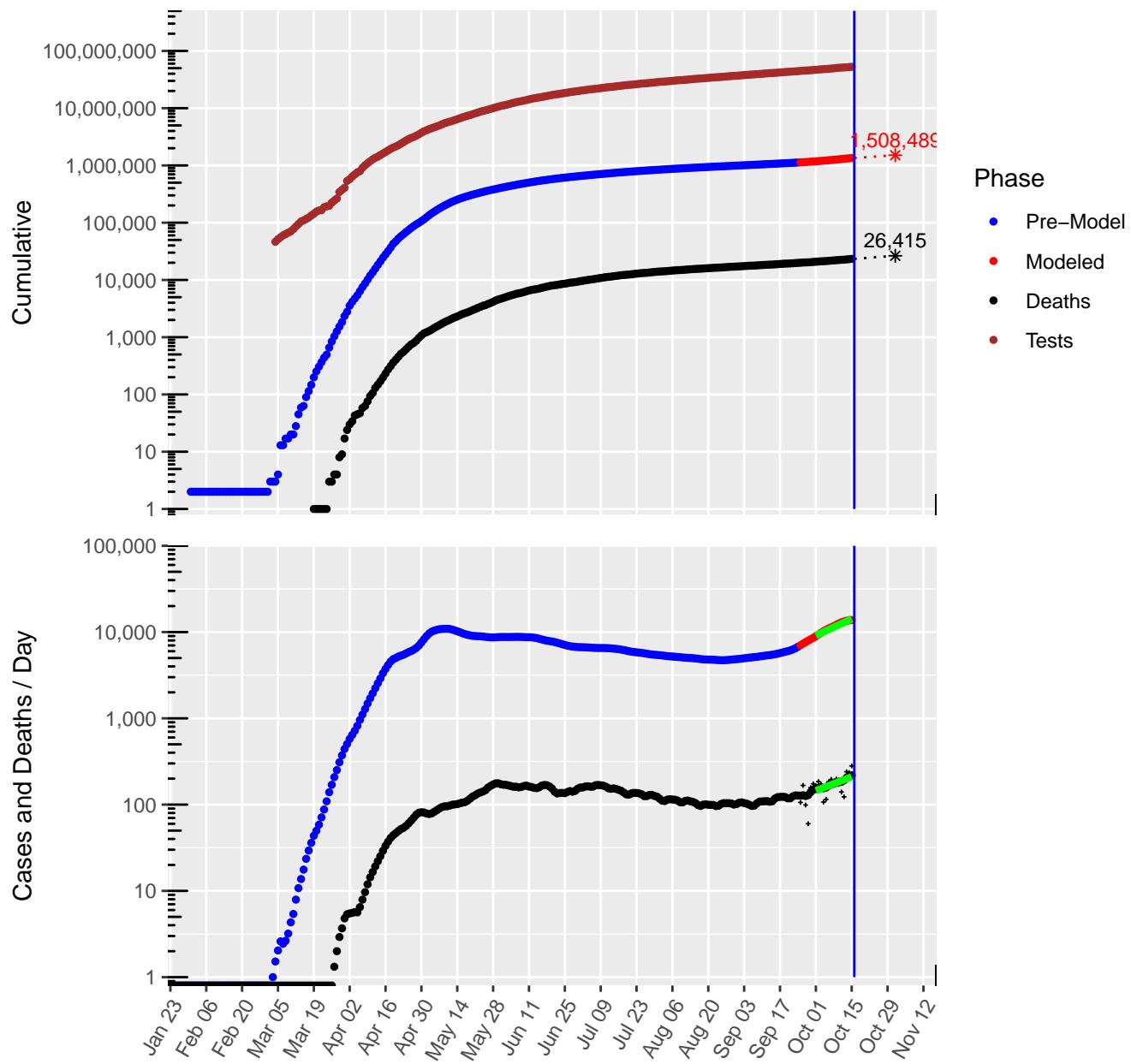


298) -- Deaths: 9,756 (37) -- Case Mortality: 5.0% -- Daily Change: +2.3% Cases, -4.6% Deaths

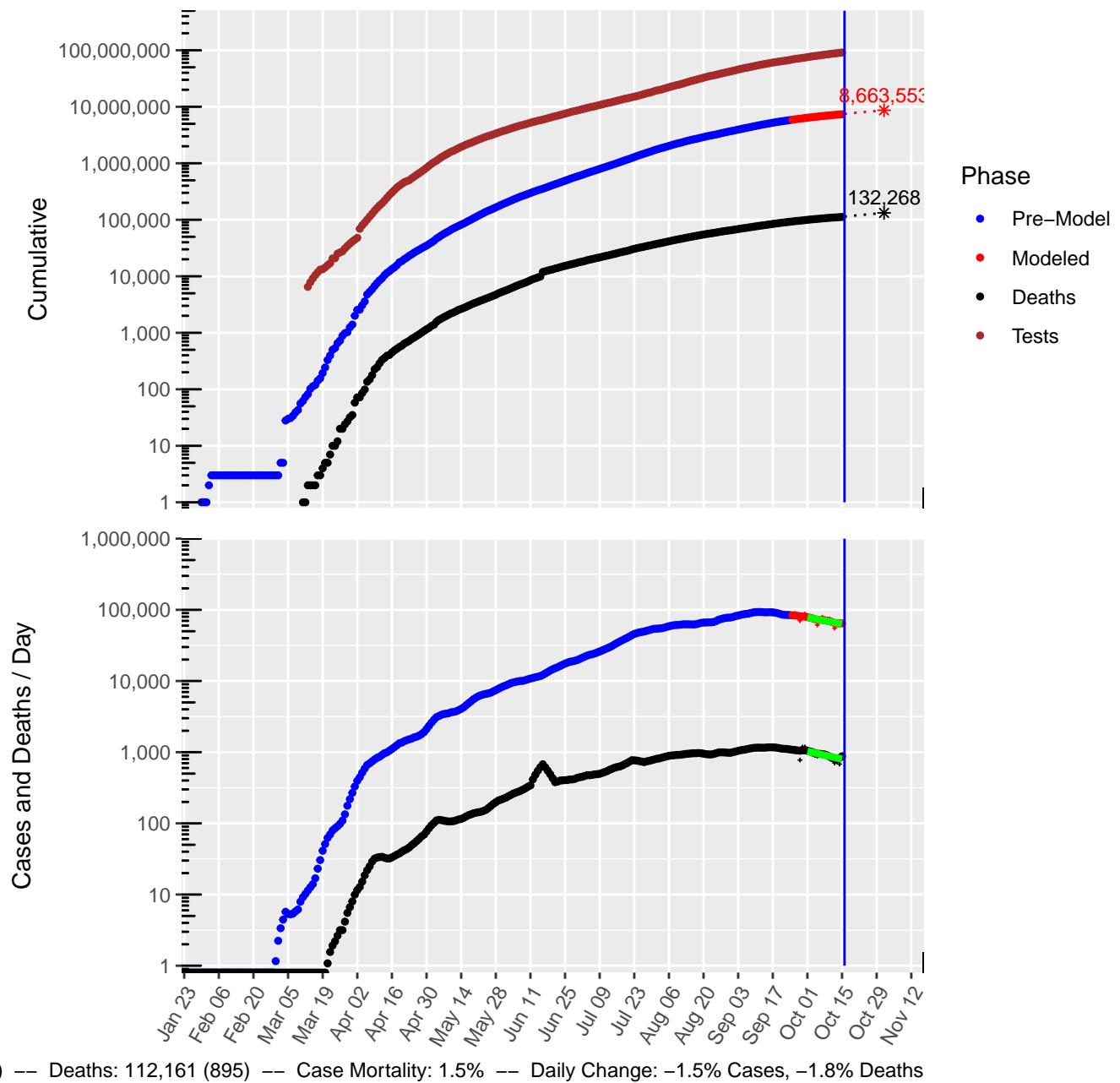
# Ukraine projection as of 2020-10-16



# Russia projection as of 2020-10-16



# India projection as of 2020-10-16



# Pakistan projection as of 2020-10-16

