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# Oregon Corrections Population Forecast

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April 1, 2016

## Background

The Office of Economic Analysis (OEA) produces the semi-annual Oregon Corrections Population Forecast which provides projections of the offender populations supervised by the Oregon Department of Corrections (DOC). The forecast estimates the number of inmates in the state prison system, offenders on probation, parole, post-prison supervision, and felony offenders serving sentences of 12 or fewer months in county jails.

Executive Order 95-06 and Oregon Revised Statute 184.351 direct the Department of Administrative Services (DAS) and the Corrections Population Forecasting Advisory Committee to produce the forecast. The forecast is mandated to estimate monthly populations over a ten-year period and is published April 1<sup>st</sup> and October 1<sup>st</sup> of each year. State agencies, in particular the DOC and the Oregon Criminal Justice Commission (CJC), are mandated to use the forecast for budgeting and policy development where the offender population is concerned.

The Advisory Committee, whose members are appointed by the Governor, is comprised of individuals with knowledge of the criminal justice system. Advice from the Committee forms the basis for forecast assumptions regarding policy and practices in the criminal justice system and the impact of law and policy changes on the corrections populations. Committee members bring to the forecast process decades of diverse experience in the public safety system. They meet several times prior to each forecast release to discuss forecast-related issues such as trends in crime, potential impact of new laws, changes in public safety policy or practices, and to advise technical aspects of the forecast process.

### Corrections Population Forecasting Advisory Committee

Honorable Julie Frantz (Chair)	Multnomah County Chief Criminal Judge
John Haroldson	Benton County District Attorney
Greg Hazarabedian	Public Defender Services of Lane County
Michael Schmidt	Criminal Justice Commission
Charles Sparks	Multnomah County Deputy District Attorney
Colette Peters	Director Department of Corrections
Jeffery Wood	Director Marion County Community Corrections
Jason Myers	Marion County Sheriff

The general forecast process, the publication of the forecast (this document), and technical aspects of performing the forecast (e.g., data analysis), are managed by OEA, in partnership with the CJC, and with substantial assistance from the DOC.

For more information or questions regarding the forecast please use the following contact information:

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## **Forecast Assumptions**

The forecast assumes that current laws and current criminal justice practices continue as they are now. It also assumes trends in criminal activity continue and demographics follow expected trends. If those or other assumptions fail, the forecast is at risk.

In the outer years of the forecast, fundamental shifts in criminal tendencies in the general population pose a risk to the forecast. For example, over the past decade overall crime rates, including serious person crimes, have declined. If that trend were to reverse itself over the coming decade, the corrections population could expand well beyond current forecast.

Criminal justice system practices have a significant effect on the flow of individuals through the court system and into the prisons. Emphasis on specific criminal activity and plea practices, for example, can change based on law enforcement policy and prosecutorial discretion. The amount of discretion in the corrections system, in particular with respect to prosecution of crimes and punishments sought, introduces a considerable degree of uncertainty to the forecast. Even if there was never a change in criminal activity or laws in Oregon, the prison population could vary considerably based on administrative procedures, policies, and individual discretion exercised in law enforcement, prosecution, plea bargaining, and sentencing by judges.

## **Forecast Methodology**

### ***Inmate Population***

The inmate forecast uses a model which simulates inmates entering prison, their length of stay in prison, and final release. The primary driver of the forecast in the short term is the release rate of the existing prison population. In the long term, new intakes drive population trends. The rate of intakes and releases results in turnover of about half the inmate population every 18 months.

The long term prison population depends primarily on the forecast of future intakes (number and lengths of stay). In contrast to releases, future prison intakes cannot be mechanically determined based on any current information. Intakes are forecasted based on historical trends and anticipated population growth in Oregon. The trend integrates demographics, crime rates, criminal justice practices, and other factors which influence intakes and sentence lengths. The forecast assumes future intakes will be similar to what is observed in trends from the recent past. The release profile for future intakes is a function of recent patterns as well.

As a technical note, modeling the prison population relies on both the number of intakes each month and how long each inmate will stay. The forecast handles the number of expected releases by simulating the full distribution of lengths of stay. The forecast tracks the number of intakes broken down by lengths of stay in one month increments up to 10 years. The total time in months created by adding up all the individual lengths of stay for intakes is termed 'intake volume', and is measured in bed-months. For example, if intakes occurred at a fixed level of 10,000 bed-months per month for many years, the prison population size will eventually equal 10,000 beds. That would represent a long-run steady-state population level where intakes exactly equal releases every month.

Prison intakes are the major determinant of the long term prison population size, so it is valuable to have factors which are predictive of future intakes. The size of Oregon's population, as well as its age and gender mix, are primary determinants of future intakes. Changes in criminal sentencing laws are another major factor. When sentencing laws change, the full effect on prison populations can take years to be fully realized, but an attempt is made to estimate and incorporate the complete policy impact in the forecast as soon as the law is passed.

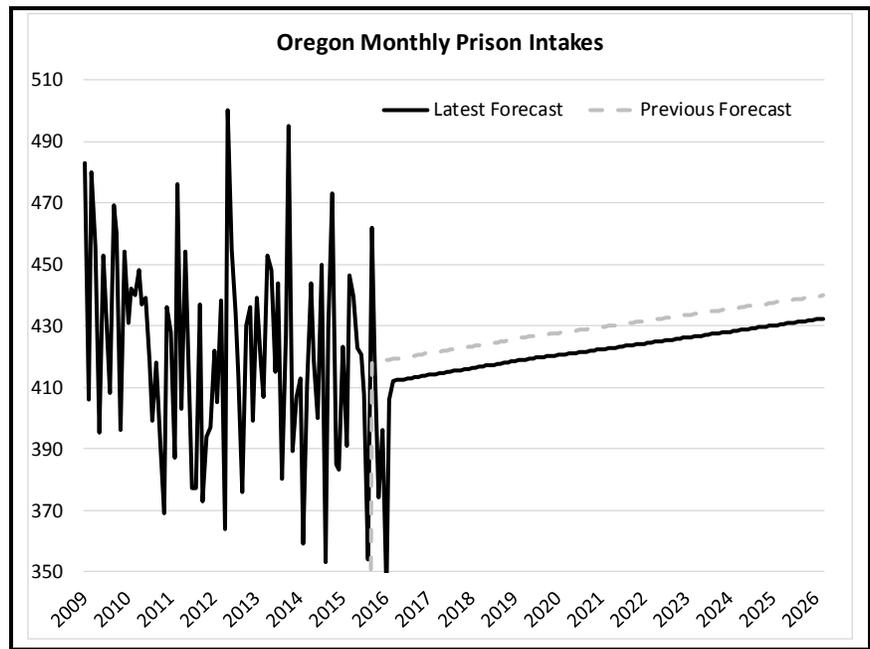
Various other factors have been suggested and checked for possible value in predicting future prison intakes. These include trends related to crime, the economy, student assessments, and court filings. Generally speaking, aside from population cohort sizes, there are no obvious causal (or predictive) relationships to prison trends which the forecast can rely on. Therefore, the forecast for future intakes is solely based on intake trends from the recent past with adjustments for law changes and population growth.

The final forecast is the sum of individual forecasts that explicitly break it down into smaller pieces to improve transparency and to better illuminate the potential impact of future policy reforms. Detailed forecasts are generated by gender and by crime type. This has broken the forecast down into smaller pieces which are more manageable for analysts and allow forecasters to highlight more detailed crime trends.

The forecast is seasonally adjusted<sup>1</sup>. It is known that the prison population oscillates in a seasonal pattern. Depending on the day of the week or month, prison populations can change by almost 100 prisoners. An algorithm has been created that simulates these variations and implements them into the current forecast. Incorporating seasonal trends explains most of the recent variability in the short-term forecast, and makes the near-term forecast considerably more accurate.

### ***Intake Trends***

The graph to the right presents intakes to prison for all offenders. The first thing to note is that the monthly variance in intakes is quite large. This introduces significant month-to-month volatility into the prison population. Intakes began to increase with the resumption of Measure 57 in January 2012. This was followed by a level shift down with the implementation of HB 3194. Intakes dropped significantly in the last three months, which resulted in the shift down in the intake forecast for all inmates.



### ***Release Profile of Incoming Inmates***

The graph to the right presents the release profile of recent intakes, which is a critical component in forecasting the length-of-stay characteristics of future intakes. Note that for each given intake class, roughly half will be released within 18 months. The committee reviewed the release profile assumptions used in deriving the current inmate forecast. In particular, the committee discussed the reference period used for each subpopulation and approved using the most recent 24 to 36 months to smooth out month-to-month volatility in the release profile while capturing the latest information about sentencing characteristics in Oregon.

<sup>1</sup> Standard economics' "seasonal adjustment" evens out seasonal oscillation and derives underlying trends. The DOC seasonal adjustment does the opposite, it implements seasonal oscillation into underlying trends to better forecast a precise month.

## ***Modeling the Inmate Population***

Conceptually, the forecast model operates as a sequence of discrete months, feeding forward from one month to the next. Each month starts with the base population for the month; i.e., a distribution of expected length of stay for inmates who are in the prison population on the first day of the month.

Lengths of stay less than one month represent inmates who will be released prior to the next month and are removed from the model. The number of intakes and distribution of their

lengths of stay is projected for each month and flows into the base population for the next month. The equation below represents the elements:

$$\text{Population Base (Month 2)} = \text{Population Base (Month 1)} + \text{Intakes} - \text{Releases}$$

Starting with the April 2013 forecast, the prison population has been disaggregated into four distinct subpopulations: (1) all women; (2) Male – Person Crimes; (3) Male – Property Crimes; (4) Male – Statutory Crimes. Each population is modeled separately with its own release rate, profile and intake forecast.

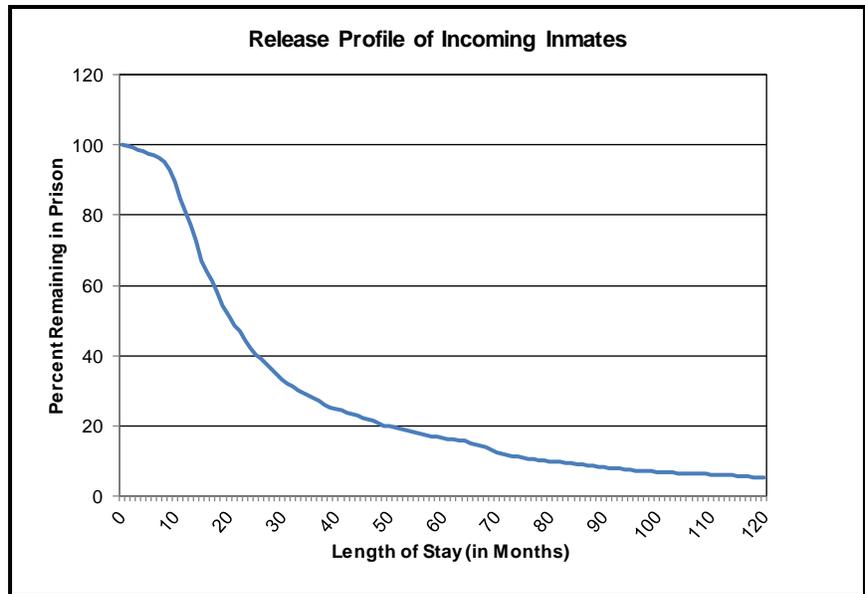
## **Forecast Risks**

### ***Dynamic Environment***

Fundamental changes in the corrections system, or its inputs, degrade the value of historical trends in forecasting and present a considerable risk to forecast accuracy. System changes establish new relationships between criminal activity and the prison population, and those relationships cannot be known until after stability in the system is reestablished. For example, Measure 11 had considerable indirect impact on the prison population via changed plea practices. It took several years following the implementation of Measure 11 for that effect to be known.

Starting in January 2009, there have been several significant changes in the corrections system from Ballot Measure 57 (2008), House Bill 3508 (2009), Senate Bill 1007 (2010), Ballot Measure 73 (2010), Senate Bill 395 (2011) and most recently HB 3194 (2013). In this forecast, adjustments are made for the expected incremental impact of House Bill 3194. For most components of the law change, such as diversion of marijuana offenses to probation and lessened minimum sentence lengths for other drug crimes and identity theft, the impacts of the law are mostly subsumed into the model. The one exception is for the 90-day transition leave component, which does not affect model assumptions. This component will remain an outside-the-model add factor for as long as the policy is in place.

One downside risk owes to nascent criminal justice programs that are just starting to have an effect on the prison population. These programs include the Justice Reinvestment Program<sup>2</sup> and the Family



<sup>2</sup> <https://olis.leg.state.or.us/liz/2013R1/Downloads/MeasureDocument/HB3194/Enrolled>

Sentencing Alternative Program<sup>3</sup>. The Justice Reinvestment Program provides grants to counties that support community based sanctions, services, and programs that are designed to meet the four main program goals. The program goals are to decrease the county’s utilization of imprisonment in a Department of Corrections institution, reduce recidivism, increase public safety, and increase offender accountability. Many of the Justice Reinvestment grant funded programs began operation very recently, and although it's too early to predict their precise impact on the prison population, the early data appears to show a significant decrease in the area of male property offenders.

The Family Sentencing Alternative Program is a pilot program in five counties designed to provide alternative sentencing options for primary caregivers of minor children while providing additional accountability, treatment, and parenting skills.

This April 2016 forecast does not include adjustments for the potential impact of these programs due to the fact that they are just in the formative stages and data do not exist to produce reasonable estimates. As the programs progress, the Office of Economic Analysis and the Criminal Justice Commission will reevaluate data availability and may introduce structural impacts into the model.

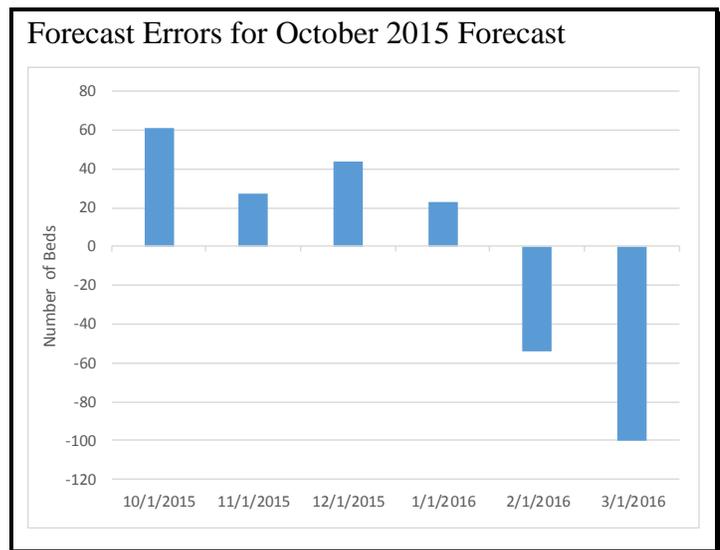
***Future Policy Changes***

In recent years, most forecast errors can be traced to changes in public policy rather than demographic or behavioral changes among potential prisoners. Given the dynamic policy environment, policy changes represent the largest risk to the forecast. As has been proven in recent years, voter initiatives have the potential to drastically change the public safety system. The fiscal condition of state and local governments also represents a risk to the forecast. In particular, counties which have historically received federal timber payments face significant budget risks which could impact the public safety system, and potentially change the quantity and character of felony sentences. Fewer fiscal resources dedicated to public safety would be expected to reduce the prison population in the near term, but that effect could later reverse if underlying crime rates increased.

**Forecast**

***Prison Inmate Prior Forecast Tracking***

Forecast errors for the last forecast were a mix of positive and negative deviations. The average error for the forecast was zero beds. Male-Person errors were primarily positive, while Male-Property errors were progressively negative over the six-month horizon. Male-Statutory beds were the same as the forecast, on average. Female errors were positive throughout, averaging 21 beds above the forecast.

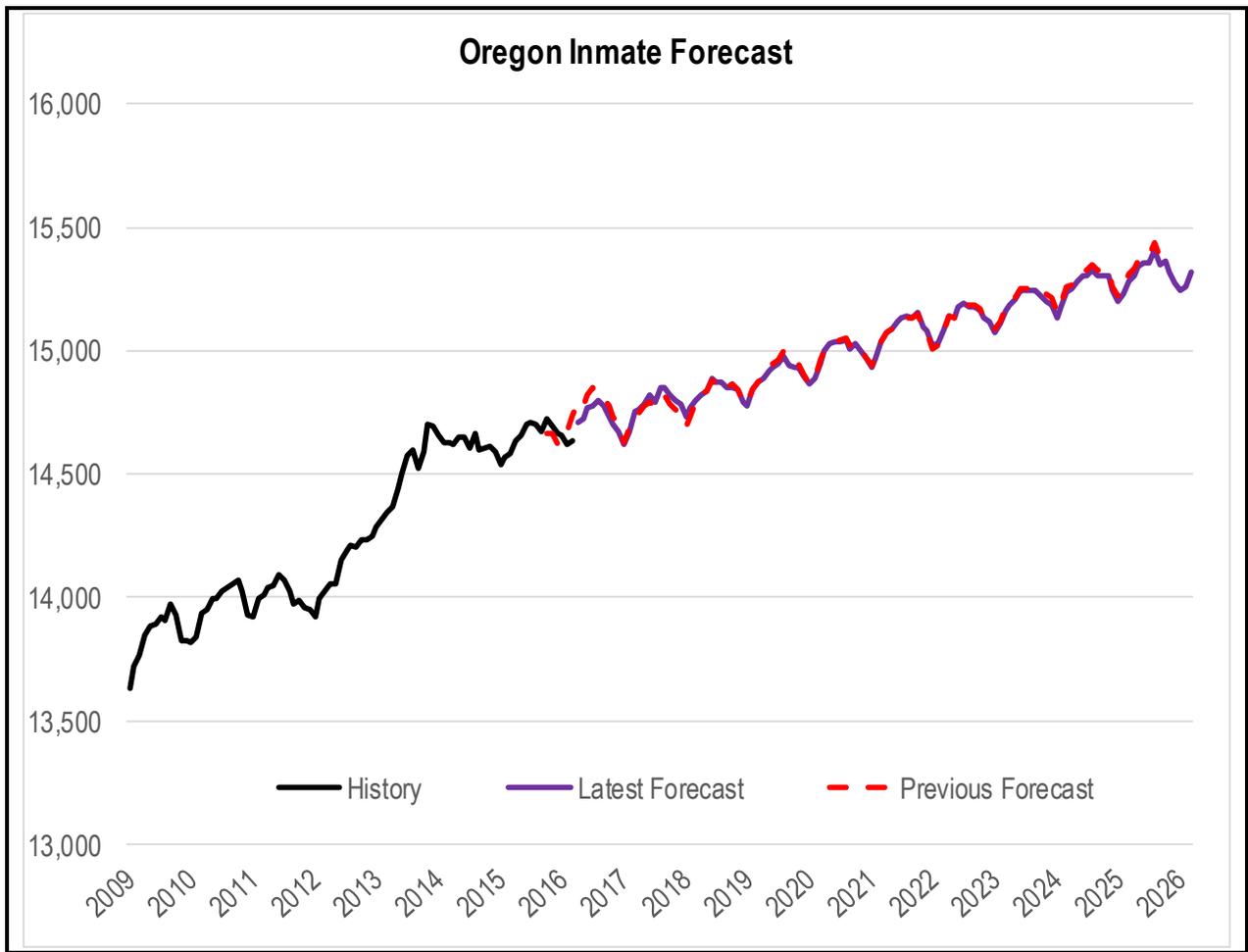


<sup>3</sup> <https://olis.leg.state.or.us/liz/2015R1/Downloads/MeasureDocument/HB3503/Enrolled>



### ***Prison Inmate Forecast***

The number of inmates housed in Oregon's prisons, currently 14,636, is expected to grow to 15,319 inmates by March 2026, a growth rate of 4.7 percent. To put that in context, Oregon's population is expected to grow 12.2 percent over the same timeframe. As a result, the incarceration rate (prison beds per 1,000 population) is expected to fall 6.9 percent over the next ten years. The forecast is little changed from the prior forecast, although there are significant changes at the gender and crime type level as detailed below.



## Male

The accompanying graph illustrates the total male inmate population forecast.

The current male forecast estimates that on March 1, 2026 there will be 13,947 male inmates—a growth of 4.5 percent. The modest shift down in the male inmate forecast over the forecast horizon is due primarily to fewer-than-projected intakes during recent months.

## Female

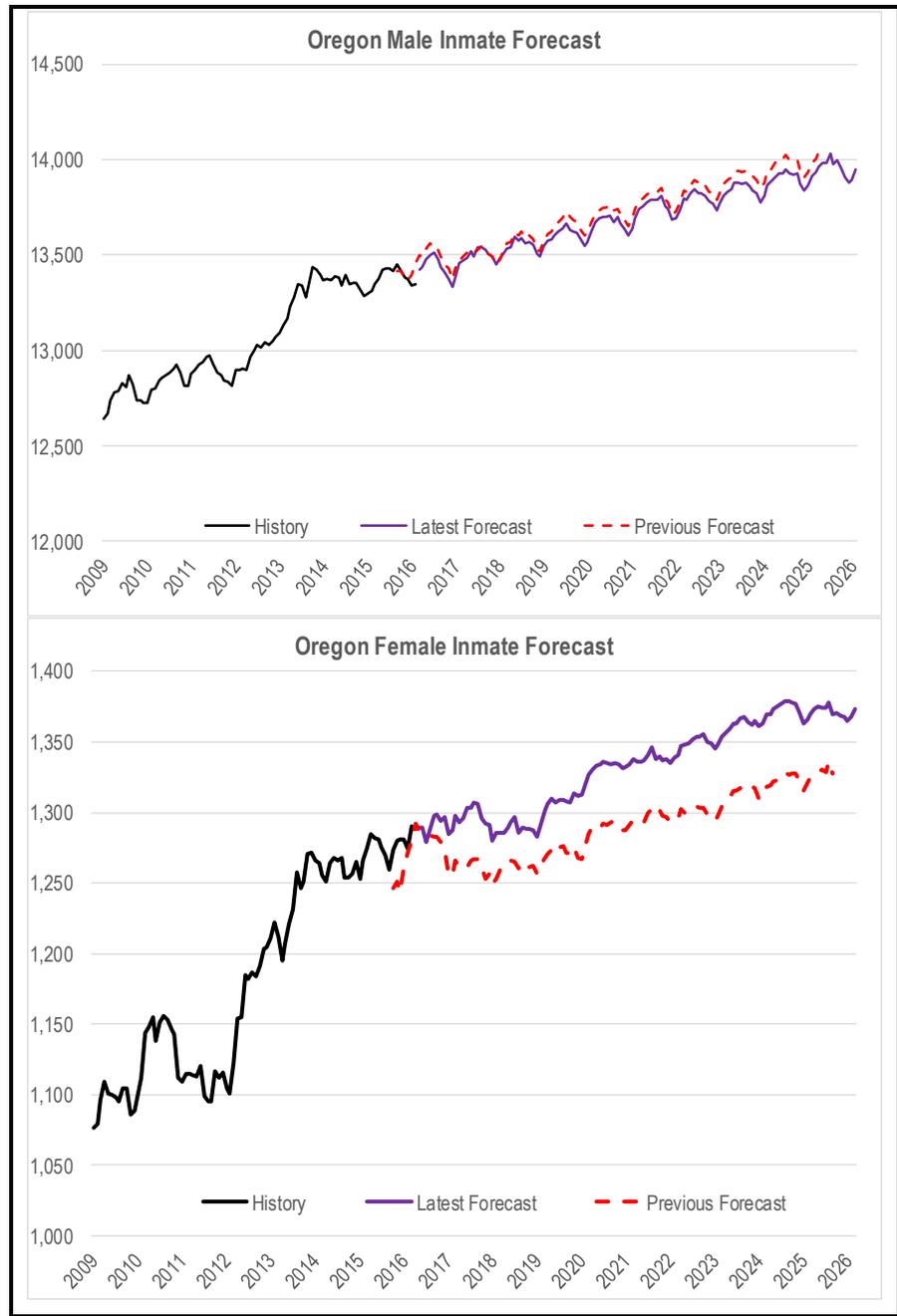
The graph to the right illustrates the total female population forecast.

Female growth over the forecast horizon (April 2016 to March 2026) is 83 inmates—a 6.4 percent increase for a total of 1,373 inmates. As with the males, higher-than-expected intakes were the primary driver behind the jump in the forecast.

## Male Person, Property and Statutory Offenders

The updated model forecasts males by offense type<sup>4</sup>. Male person crime inmates (a large portion being Measure 11 inmates) are expected to exhibit growth of 3.5 percent over the forecast period. This translates into a growth of 332 inmates.

Male property crime inmates are expected to grow by 202 inmates over the next decade which translates into 8.0 percent growth. Male statutory crime inmates are expected to increase 67 inmates over the forecast horizon, a projected growth rate of 5.2 percent.



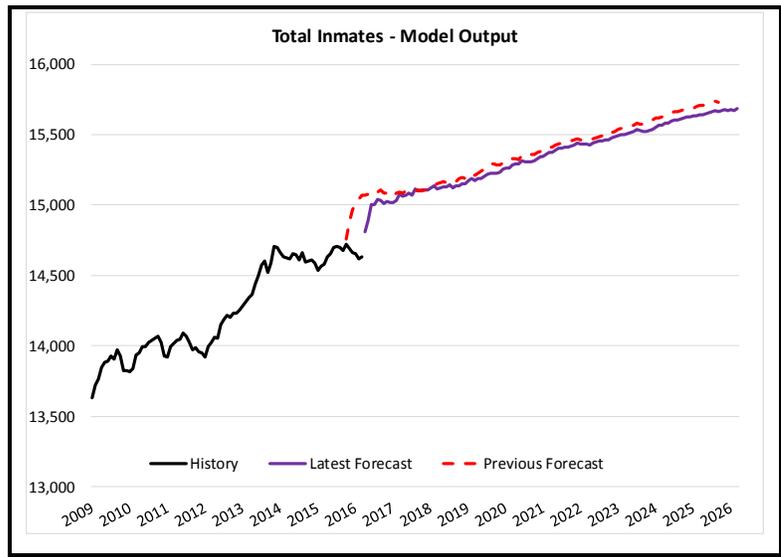
<sup>4</sup> Many offenders that commit property, statutory or person crimes can also be convicted of other crimes. These detailed forecasts therefore estimate the population of inmates with their **highest convicted** crime, not the sum of their convictions (if there is more than one conviction).

## Components of Change

There are two components of change in each prison forecast: updates to the model due to new empirical data and new law changes.

### Model Updates

When new DOC data are input into the forecast model, changes in intakes, sentence lengths, releases, etc. are integrated and create a “new normal” within the model. The graph to the right exhibits the change to the model output prior to any add factors for the prospective impact of recent law changes. The model output appears to project a near-term spike in the prison population. This is a product of how transition leave is handled in the model as a structural add-factor. Once transition leave is factored into the forecast, the near-term jump disappears (see final forecast).



### New Law Impacts

HB 3194 passed in the 2013 regular legislative session and its effects are almost fully evident in the data. While the prospective impacts incorporated into this forecast are negligible, the full impact of House Bill 3194 is still sizeable, both in terms of prison beds saved and costs avoided. As a gross measure, the number of prison beds in use today (14,636 as of March 1, 2016) is about 400 beds below the projection (April 2013) that preceded the passage of the bill<sup>5</sup>.

### Margin of Error

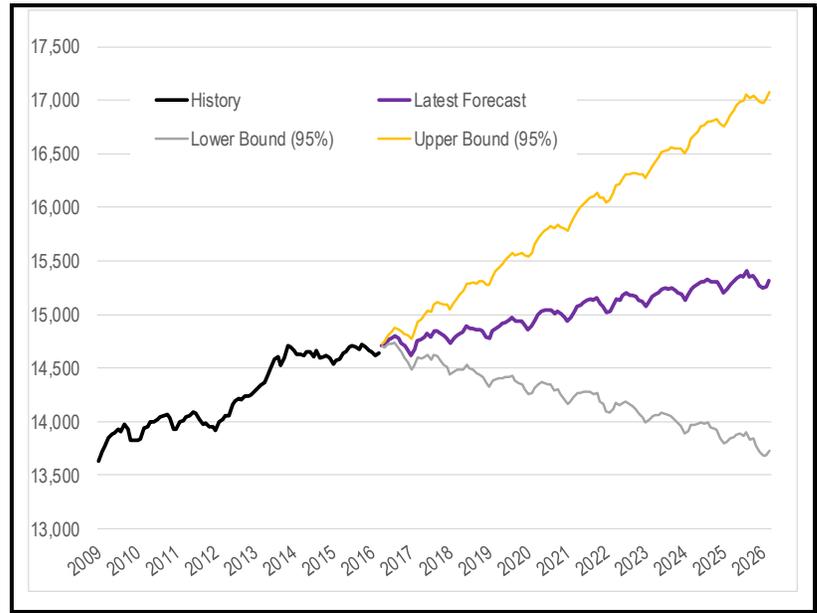
Oregon HB 3194 directs that the Department of Administrative Services “identify the forecast’s margin of error” (Section 46-3(a)). The margin of error depends on the timeframe being examined. Historical error rates serve as a guide for assessing the potential for actual prison population counts to differ from the forecast in the near term.

The historical deviation for April of even year forecasts, when gauged at the end of the same biennium, is 1.4 percent. As such, there is a 95 percent probability that the actual prison population will fall in the 14,379 to 15,207 range. The primary driver for potential upward error in the near term is error in the forecast for releases and intakes in the coming months.

In addition to the forecast’s role in near- to medium-term budgeting, the forecast is also used to guide long-term planning for prison capacity. Coming up with a predicted margin of error for the 10-year forecast is complicated by the fact that major law changes (Measure 11, Measure 57, HB 3508, and HB 3194) produce large errors in the forecasts that preceded their passage. The prison forecast presented here does not anticipate potential law changes. The 10-year margin of error for this forecast should coincide with potential model error, thus making historical error rates inappropriate. A better gauge is

<sup>5</sup> A white paper on the impact of House Bill 3194 is available at <http://www.oregon.gov/cjc/justicereinvestment/Documents/Justice%20Reinvestment%20Implementation%20in%20Oregon.pdf>. The analysis will be updated as new data become available.

derived from analyzing growth rates for time frames more or less absent of law changes to assess the potential for the projected baseline growth of 4.7 percent to be off. Computed in this way, there is a 95 percent probability for the actual inmate count to differ from this forecast by up to 10.9 percent in either direction.



### *Community Corrections*

The community corrections population involves felony offenders who are not in prison. The Department of Corrections receives General Fund that it passes to 34 of the 36 counties to provide direct oversight. In Linn and Douglas counties, the Department staffs the community corrections department directly.

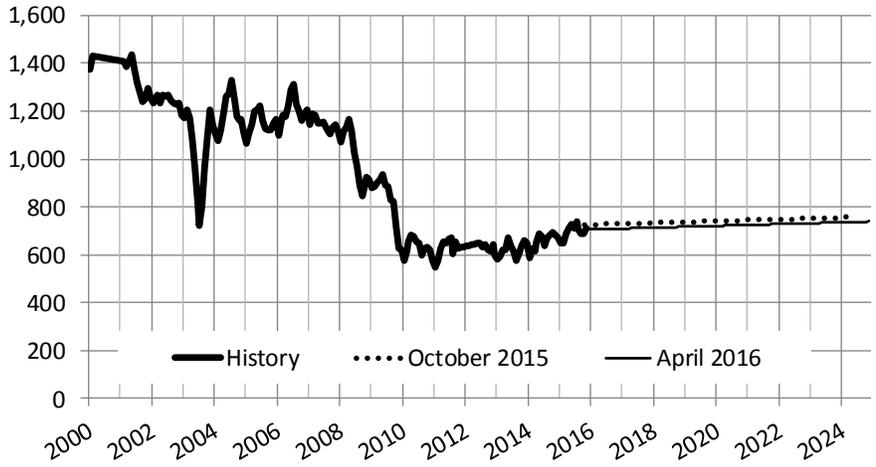
The forecast projects the felony probation caseload, local control population (incarceration in jail), and post-prison supervision and parole (Parole/PPS). Each group is forecasted separately for budgeting purposes. The community corrections forecasts rely primarily on the relatively stable historical trends in the respective populations.

The forecasts for Local Control, for Parole/Post-Prison Supervision, and for Probation populations reflect changes to match the most recent data on actual population sizes. In particular, the probation population declined significantly in recent months. The forecast assumes a modest reversal and then flattens out to be consistent with the trend observed in recent years.

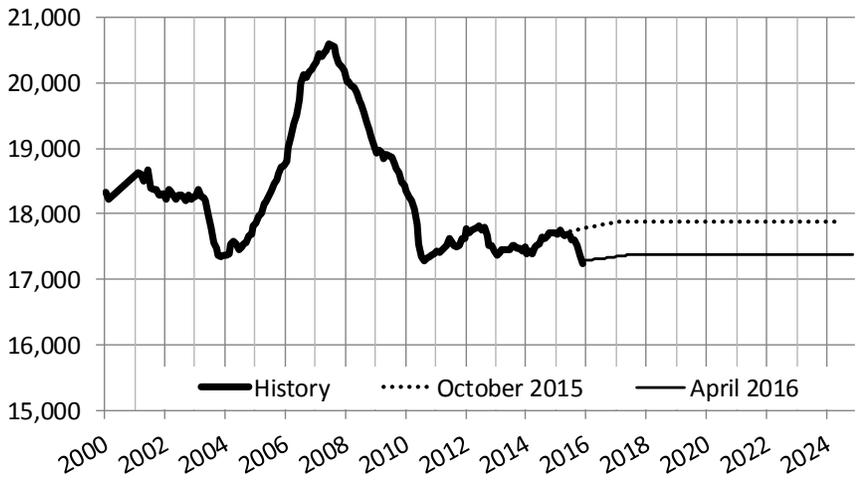
The Local Control forecast numbers do not include jail beds occupied by repeat DUI offenders which are reimbursable under Measure 73 (2010). The reimbursement provisions of Measure 73 require separate budgeting for those beds, and, while the majority of the jail usage falls under the umbrella of Local Control, pre-trial jail time does not.

The three graphs below (next page) show the population history (heavy line), the current forecast (light line), and the previous forecast (dotted line) for the local control, the probation, and the parole/PPS population groups.

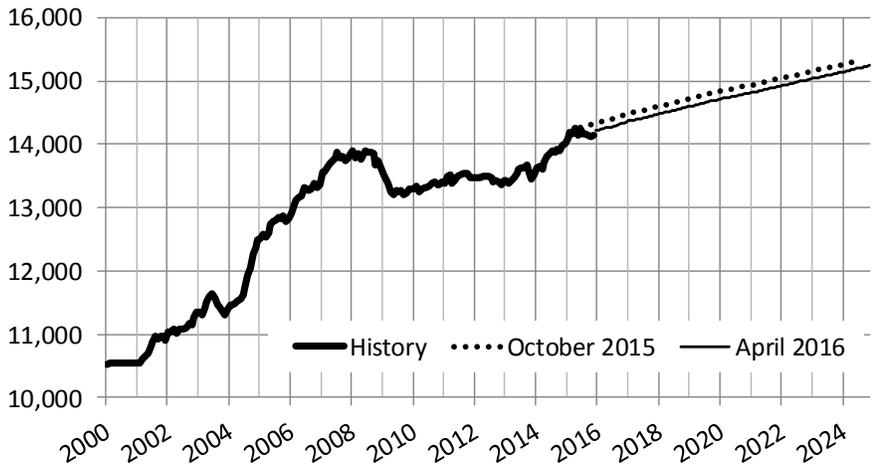
### Local Control Forecast



### Probation Forecast



### Parole / Post-Prison Supervision Forecast



## **Law Change Impacts**

This forecast is based on current laws and practices, meaning that projections assume crime and sentencing laws and practices will not change over the 10 year forecast horizon. Laws currently in effect, including recently enacted changes, are incorporated in the forecast. For recent law changes, the forecast applies specific adjustments; for older law changes, the effects are part of the baseline data and are determined within the model. The forecast adjustments for recent law changes generally derive from the financial/fiscal impact statements for the associated bill or ballot measure until new data become available.

### ***Sources of Forecast Error***

Forecast error is the difference between what was forecasted at a specific point in the future and what is actually observed when that time comes. Understanding the sources of forecast error is helpful in interpreting forecast risks.

The largest source of forecast error is associated with law changes which become effective after the forecast is released. There have been a number of laws over the past 20 years which caused, or were expected to cause, prison population changes of a magnitude significant to the forecast. The forecast does not project law changes or practical application of current law, but rather assumes the current legal environment persists unchanged across the 10-year forecast projection period.

Forecasts released following major law changes can suffer from incorrect estimates of the impact of the law change on the prison population. This is because law changes often have a significant indirect impact that is not known until it is evidenced by data, sometimes months or years later.

Regardless of law changes, there are additional sources of error with baseline forecast projections. The forecast relies on modeling the release of current prisoners and projecting the intake of future prisoners. Although the sentences pronounced in court judgments are known, the actual length of stay of an inmate in prison can vary considerably from what is expected based on the judgment. This introduces error into the model. Situations which make the length of stay indeterminate include: resentencing to a longer or shorter sentence; indeterminate parole board sentences (before the guidelines); participation and success in Alternative Incarceration Programs; Transition Leave; time served after failure on probation or parole; death of the inmate; transfer in/out of state; amount of earned time earned; absconding or return from absconding; temporarily out for medical reasons or court appearance.

Further out in the forecast horizon, error in projecting future prison entrants can be significant. The forecast accuracy depends on the accurate projection of the number future prison intakes and their lengths of stay. Differences of as little as one percent in projected intake rates could add to an overall error of 1,000 beds over the forecast horizon. As such, the outer years of the forecast are very sensitive to the accuracy of assumptions regarding new intakes.

Finally, daily variation in the prison population due to intake and release activity is considerable. The population on a given day regularly deviates from the monthly average population by more than 100 beds. Therefore, the actual population on the first day of a given month can be expected to differ from the forecast value by 100 beds without concern. This also means that forecast values should be interpreted as the mid-point of a range (+/- 100) within which the actual population will fluctuate.

## **Appendix: Prison Population Forecast Values**

All forecast values are published in spreadsheet format and can be viewed and downloaded from the link below. The spreadsheet includes forecast data tables for the prison and community corrections forecasts and some additional forecast-related data such as: male and female forecasts; Male-person, -property

and -statutory forecasts; seasonally and non-seasonally adjusted forecasts; and new law impact estimates.

<http://oregon.gov/DAS/OEA/corrections.shtml>.

