



ASSESSMENT OF SPACE NEEDS PROJECT

User's Guide to *Juvenile Forecaster*

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research for safer communities

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PROGRAM ON
youth justice



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Report design by David Williams

About the Assessment of Space Needs Project

This document was prepared as part of the *Assessment of Space Needs Project*, conducted by the Urban Institute of Washington, D.C. The project began with a request from the U.S. Congress. In a November 13, 1997 Conference Report for Public Law 105-119, Congress requested that the U.S. Department of Justice conduct a “national assessment of the supply and demand for juvenile detention space,” including an assessment of detention and corrections space needs in 10 States. In particular, Congress expressed this concern:

The conferees are concerned that little data exists on the capacity of juvenile detention and corrections facilities to handle both existing and future needs and direct the Office of Justice Programs to conduct a national assessment of the supply of and demand for juvenile detention space with particular emphasis on capacity requirements in New Hampshire, Mississippi, Alaska, Wisconsin, California, Montana, West Virginia, Kentucky, Louisiana, and South Carolina, and to provide a report to the Committees on Appropriations of the House and the Senate by July 15, 1998 (U.S. House of Representatives 1997).

The U.S. Department of Justice’s Office of Justice Programs (OJJDP) responded to this request by taking two actions. The first action was to submit the required report to Congress in July 1998 (see DOJ 1998). The report was prepared by OJJDP with assistance from the Urban Institute, the National Center for Juvenile Justice, the National Council on Crime and Delinquency, and the American University in Washington, D.C.

The second action taken by OJJDP was to fund a more extensive investigation of the issues raised by the report as part of the Juvenile Accountability Incentive Block Grants program. The investigation, known as the Assessment of Space Needs in Juvenile Detention and Corrections, was conducted by the Program on Youth Justice within the Urban Institute’s Justice Policy Center. The project analyzed the factors that contribute to the demand for detention and corrections space in the states and the methods used by states to anticipate future demand. Products of the work included an Internet-based decision-making tool that state and local juvenile justice agencies may employ to forecast future detention and corrections populations (<http://jf.urban.org>). The *Assessment of Space Needs Project* was completed in March 2002.

The Urban Institute’s approach to conducting the *Assessment of Space Needs Project* was guided by the comments and criticisms received from the project’s advisors and consultants:

Advisory Committee

- Dr. Arnold Irvin Barnett, Massachusetts Institute of Technology
- Dr. Donna M. Bishop, Northeastern University
- Mr. Edward J. Loughran, Council of Juvenile Correctional Administrators
- Dr. James P. Lynch, American University
- Dr. Samuel L. Myers Jr., University of Minnesota
- Ms. Patricia Puritz, American Bar Association

Consultants

- Mr. Paul DeMuro, Independent Consultant, Montclair, New Jersey
- Dr. William J. Sabol, Case Western Reserve University
- Dr. Howard N. Snyder, National Center for Juvenile Justice
- Mr. David J. Steinhart, Independent Consultant, Mill Valley, California

For more information about the *Assessment of Space Needs Project*, see the web site of the Urban Institute’s Program on Youth Justice at <http://youth.urban.org> or telephone the Urban Institute at 202-833-7200 or OJJDP at 202-307-5929.

About the Author

Jeffrey A. Butts (Ph.D., University of Michigan) is the director of the Program on Youth Justice at the Urban Institute in Washington, D.C. He conducts research on policies and programs for youthful offenders, including recent projects on the impact of teen courts, juvenile drug courts, and the methods used by state and local governments to assess future demand for juvenile corrections space. Before joining the Urban Institute in 1997, he was a researcher at the National Center for Juvenile Justice in Pittsburgh. He began his juvenile justice career in 1980 as a drug counselor with the juvenile court in Eugene, Ore.

About the Urban Institute

The Urban Institute is a nonprofit nonpartisan policy research and educational organization established in 1968 to examine the social, economic, and governance problems facing the nation. It provides information and analysis to public and private decisionmakers to help them address these challenges and strives to raise citizen understanding of these issues and trade-offs in policymaking.

About the Justice Policy Center

One of nine policy centers within the Urban Institute, the Justice Policy Center carries out nonpartisan research to inform the national dialogue on crime, justice, and community safety. Researchers in the Justice Policy Center collaborate with practitioners, public officials, and community groups to make the Center's research useful to not only decisionmakers and agencies in the justice system, but also to the neighborhoods and communities harmed by crime and disorder.

About the Program on Youth Justice

This manual was developed by the Urban Institute's Program on Youth Justice, which identifies and evaluates programs and strategies for reducing youth crime, enhancing youth development and strengthening communities. The Program on Youth Justice is housed within the Justice Policy Center. It was established by the Urban Institute in 2002 to help policymakers and community leaders develop and test more effective, research-based strategies for combating youth crime and encouraging positive youth development.

Researchers associated with the Program on Youth Justice work to transcend traditional approaches to youth justice research by

- studying all youth, not just those legally defined as juveniles;
- considering outcomes for families, organizations, and communities as well as individuals;
- sharing insights across the justice system, including prevention programs, police, courts, corrections, and community organizations; and
- drawing upon the expertise of multiple disciplines, including the social and behavioral sciences as well as professional fields such as medicine, public health, policy studies, and the law.

Acknowledgments

The *Assessment of Space Needs Project* was funded by the Office of Juvenile Justice and Delinquency Prevention (OJJDP) and is housed within the Urban Institute's Justice Policy Center and the Center's Program on Youth Justice. The original conceptualization of this and other products from the *Assessment of Space Needs Project* was informed by discussions with members of the project's Advisory Committee and consultants, especially William Sabol, formerly of the Urban Institute, and Howard Snyder of the National Center for Juvenile Justice.

Current and former employees of the Urban Institute played critical roles in the project and in the design of *Juvenile Forecaster*, notably Matthew Buettgens of the Urban Institute's Information Technology division, who prepared the HTML and database programs for *Juvenile Forecaster*. Dr. Daniel Mears of the Urban Institute's Justice Policy Center authored several project reports and contributed to the conceptualization and design of the web site. Emily Busse and Alexa Hirst helped to organize the information gathered during the project's visits to juvenile justice agencies throughout the country. Adele Harrell, director of the Justice Policy Center, and Ojmarrh Mitchell, formerly of the Justice Policy Center, provided important criticisms of the overall design of the *Assessment of Space Needs Project*, and Nicole Brewer, Dionne Davis, and Erika Jackson played other key roles in ensuring the success of the project. David Williams was responsible for the graphic design of the project's various reports.

Development of the study and the products resulting from it benefited from the significant contributions of a number of people within OJJDP, most importantly the project's program manager, Joseph Moone, who devised the original plan for the project and ensured that the staff received the support it needed for successful completion. Special thanks are also extended to J. Robert Flores, the current administrator, and William Woodruff, the current deputy administrator of OJJDP. The project is grateful to the previous occupants of those positions as well, Shay Bilchik and John Wilson, respectively. Within OJJDP's Research and Program Development Division (RPDD), the project owes much to the director, Kathi Grasso; deputy director, Jeffrey Slowikowski; and former director, Betty Chemers.

Finally, the Urban Institute gratefully acknowledges the patience and efforts of the many state and local officials who hosted the project's site visits and assisted in the collection of data and other information. In particular, the study could not have been conducted without the support of the following agencies:

- California Youth Authority
- California Board of Corrections
- Florida Department of Juvenile Justice
- Florida Legislative Office of Economic and Demographic Research
- Kentucky Department of Juvenile Justice
- New Hampshire Department of Youth Development Services
- Oregon Office of Economic Analysis
- Oregon Youth Authority
- Texas Juvenile Probation Commission
- Texas Youth Commission
- Texas Criminal Justice Policy Council
- West Virginia Division of Juvenile Services
- Wisconsin Department of Corrections, Division of Juvenile Corrections
- Wisconsin Office of Justice Assistance
- Wisconsin—Dane County Juvenile Court Program
- Wisconsin—Milwaukee County Department of Human Services, Delinquency & Court Services Division.

User's Guide to *Juvenile Forecaster*

SUMMARY

Juvenile Forecaster is an interactive planning tool designed for juvenile justice professionals and others who need to anticipate the size of future detention and corrections populations. Best used as part of a more detailed forecasting process, Juvenile Forecaster can provide quick, accessible projections of juvenile custody populations and facilitate the sharing of projection results among the members of state and local agency networks. This manual is designed to assist new users of Juvenile Forecaster as well as those would like to have a printed reference guide to the web site.

USING JUVENILE FORECASTER

Juvenile Forecaster includes two components:

- *Population Modeler* allows users to enter their own data about juvenile corrections populations and lengths of stay to create projections of future populations for multiple groups of offenders.
- *CaseFlow Simulator* is a means of simulating the effect that aggregate changes in juvenile justice processing may have on the number of juveniles entering various programs, including residential facilities, probation caseloads, etc.

Together, the two components of *Juvenile Forecaster* are designed to serve the needs of state and local agencies that lack either the time or the resources to obtain more elaborate and detailed projections. Incorporating the use of this tool in an agency's planning process should increase decisionmakers' understanding of and access to quantitative projection methods and improve the practical value of those projections, thereby enhancing the juvenile justice system's ability to provide effective responses for youthful offenders.

In the past, agency efforts to anticipate the future size of detention and corrections populations have often suffered from the same flaw. Usually when confronted with a crisis, researchers and analysts would analyze trends in juvenile populations, juvenile arrests, or juvenile

court cases, and the results of such an analysis would be used to generate answers for policymakers—for example, because arrests have grown 50 percent, detention capacity should be increased 50 percent. Any single analysis, however, is likely to be obsolete in a relatively short time. Population projections depend on a wide range of assumptions about current and future conditions, and these conditions change constantly. Many assumptions may not be endorsed by state and local officials.

Juvenile Forecaster was designed to free agency officials from their dependence on analysts and consultants. Easy to use and always available, *Juvenile Forecaster* provides state and local agencies with the ability to conduct their own projections, to revisit these projections more frequently, to test the accuracy of their assumptions about future trends, and to incorporate the results of projections in their daily decisionmaking.

POPULATION MODELER

The most effective way to begin using *Juvenile Forecaster* is to become familiar with the navigation and data-entry requirements of the *Population Modeler*.

Setting the Forecast Horizon

One of the first decisions to make in using the *Population Modeler* is to select an appropriate time horizon. Users must decide how far into the future a population will be projected. In volatile populations or those with very short lengths of stay, a forecaster may want to project populations only a few weeks into the future. In most juvenile correctional applications, however, the time horizon will be several months or years away.

The choice of a projection horizon may depend in part on available data. Some jurisdictions may only have annual counts of admissions and they may not want to break their

annual counts into monthly counts without real data on the seasonality of admissions. In a projection using annual admissions data only, the projection horizon will necessarily be stated in terms of years, not months.

Some jurisdictions may have access to monthly or even daily data, but if their time horizon for a population projection were sufficiently long—5 years or more—annual data would be simpler to use. Even if daily or monthly counts were available, they could be aggregated into longer time periods (quarterly, yearly, etc.).

Defining Offender Groups

Projecting future population changes will usually require the population to be divided into subgroups of youthful offenders. A user may wish, for example, to project future changes in the number of offenders expected to come into a detention or corrections facility in the near future, or those expected to enter a juvenile probation program.

Most projections will involve more than one group simply because the dynamics of population change are known to vary among different groups of offenders. For example, juvenile correctional facilities may admit more property offenders than serious violent offenders, but violent offenders are likely to stay longer. A projection model would need to employ different admission rates and lengths of stay for these different offense groups.

Many more factors could be used to divide a population into subgroups. Virtually any characteristic that is potentially related to admission rates and lengths of stay may be used, including age, gender, security risk, the probability of recidivism, and family support.

Users of the *Population Modeler* will want to select the smallest most effective set of offender groups. For each group or subgroup in a projection model, users must collect data about, or create estimates for, five separate parameters or data elements. All five data elements must be collected for each unique

combination of offender groups. Users that wish to create separate models by gender, for example, would have to collect all the necessary data for both males and females.

A forecasting model that involved separate projections for males and females, and for property offenders and person offenders, would require 20 separate data elements—five data points for male person offenders, five data points for male property offenders, five data points for female person offenders, and five data points for female property offenders.

Users of the *Population Modeler* should try to divide the population into the most useful set of offender subgroups, but they should not create too many groups. Projection models that involve more than 15 offender groups are likely to become unwieldy.

Assembling the Data

Population projections must be constructed with appropriate, carefully prepared data. Users of the *Population Modeler* will discover that identifying and assembling the data elements required for a population projection is the most difficult part of any projection effort.

For each offender group that will be modeled in the projection, five data elements are required by *Population Modeler*:

1. The starting population (or current population) of juveniles in the facility or program.
2. The current rate at which youth are being admitted into the facility or program (i.e., admissions per day, per month, or per year).
3. The extent to which this admission rate is expected to increase or decrease in the future (i.e., the percentage change expected each day, month, or year over the period of the projection horizon).
4. The “average length of stay” for youth currently in the facility or program (in terms of days).

5. The extent to which the average length of stay is expected to change in the future (percentage change per time period).

In addition to these five required data points, most users of *Juvenile Forecaster* will want to enter a sixth data point for each offender group, that of per diem costs. When users enter the daily costs of placement (or services) for each offender group, the *Population Modeler* will include in its projection results the total annual costs expected in the future for each offender group as well as the entire offender population.

For each offender group that a user wishes to project, all data points must be entered into a “Projection Scenario” screen. The user then saves the scenario and runs the projection model. The results of each projection may be displayed in tabular or graphic format. Projection results include

- the expected population for each offender group for as many time periods in the future as indicated;
- a summary of the data points that produced the projection scenario; and
- the “relative error” of the projection, or the statistical chance that an actual population may be slightly higher or lower than projected, assuming all parameters in the model are accurate.

The data points used by the *Population Modeler* are designed to capture the basic ingredients of population change. The ingredients are the same for any population, whether it is juveniles in a detention center, those in a single living unit of a juvenile correction facility, or all juveniles on probation statewide. The number of youth that will be in a population at the end of a month is completely determined by

- a. the population at the beginning of the month;
- b. releases during the month; and
- c. admissions during the month.

Of course, it is much easier to identify the ingredients of population change than it is to assemble the data necessary to measure them. Indeed, two of the ingredients—future admissions and releases—cannot be measured at all since they occur in the future. The challenge in creating population projections is to devise reasonable estimates of the ingredients of change despite the fact that they cannot be known precisely. The data elements used in the *Population Modeler* are designed to do that.

1. Starting Population

Ideally, the starting population used for a projection scenario would be the actual number of juveniles in the population on the very day the projection is being calculated. Traditionally, however, the starting population is the most recent available count. For example, agency officials may not be able to say exactly how many juveniles are in a correctional facility on one particular day or at any particular moment, but they usually know what the population was on the first day of the month, or on each Monday or each Wednesday. Any recent date will suffice for a starting population as long as it is clearly identified. Note, however, that a separate starting population must be calculated for each offender group to be modeled in the projection analysis.

2. Average Length of Stay

A separate estimate for average length of stay must also be available for each offender group. Length of stay is a critical ingredient in population projections. A corrections or detention population can change dramatically if a facility's length of stay begins to change, even if admissions are stable or declining. Measuring length of stay, however, can be challenging. There are three commonly used methods of estimating length of stay among correctional populations.

EXIT COHORT ESTIMATES. The most popular measure of length of stay is the average amount of time spent in corrections by a group of youth

who were released during a given time period. Known as an “exit cohort” estimate, this technique for estimating length of stay is easy to calculate and interpret. However, it can underestimate the length of time that individuals will actually spend in correctional facilities. By definition, exit cohorts contain a large number of short stays. It is also based entirely on releases in the recent past, which then serve as a proxy for future releases.

Calculating an exit cohort estimate of length of stay is easy once the necessary data are assembled. The following example shows the data for an exit cohort of five individuals released between April 1 and June 1. By combining their admission dates and release dates and calculating each person's length of stay, it is possible to determine that this cohort's average length of stay was 87 days.

Calculating Length of Stay Using Exit Cohort Data

Cohort members	Release date	Admission date	Length of stay (in days)
Person A	April 1	January 1	90
Person B	April 10	January 1	100
Person C	April 23	February 1	82
Person D	May 15	February 1	104
Person E	June 1	March 1	61
Average			87 days

“DAYS SINCE ADMISSION” ESTIMATES. Another common measure of length of stay is the average number of days that the current population of a detention or correctional facility has been in the facility as of a certain day. This measure is easy to calculate, but it can also involve bias. As with exit cohort estimation, it involves just one source of data (the current stock).

In addition, average days since admission can significantly overestimate length of stay because the current population of any facility necessarily contains a disproportionate number of “long stayers.” An individual staying in a

facility for 100 days has a much higher chance of being included in a population count than an individual staying just 2 days. Using “days since admission” to estimate a facility’s total length of stay, therefore, would be similar to estimating the life expectancy of Americans by calculating the average age of people alive now.

If “days since admission” is the only estimate possible with existing data, however, it can still be useful, and it is simple to calculate. The following example portrays a days since admission estimate for a hypothetical population containing five individuals. Using April 1 as the current date, the average length of stay for this population would be 39 days.

Calculating Length of Stay Using Exit Cohort Data

Cohort members	Date of admission	Today’s date	Days since admission
Person A	January 1	April 1	90
Person B	February 1	April 1	59
Person C	March 1	April 1	31
Person D	March 15	April 1	16
Person E	March 31	April 1	1
Average			39 days

STOCK/FLOW RATIO ESTIMATES. A third method of estimating length of stay is to calculate a ratio of “stock” and “flow.” Stock/flow ratios are constructed from the stock of youths in a population on a given day (usually the end of the year or some measure of average daily population), and the number released from the population over a given time period (usually monthly or annually). If data on releases are not available, admissions can be used to estimate the flow, but this assumes admissions and releases are in equilibrium.

A stock/flow ratio can also be a biased estimator for length of stay if the size of the population or the release rate is changing rapidly. The extent of bias, however, may be less than that of other estimates since stock/flow

ratios involve information from two sources (volume and flow).

Calculating length of stay with stock/flow ratios is simple once the appropriate information is available. For example, assume a correctional facility had an average daily population of 300 last year and 425 juveniles were released during the year. Using this information, one could estimate the facility’s length of stay by dividing the stock (300) by the flow (425), which would suggest that juveniles stayed an average of (300/425) years, or 259 days.

As another example, assume that a juvenile detention center has a current population of 100, and center personnel consider that population typical. If 85 juveniles were released from the center during the previous month, one could estimate the center’s length of stay by dividing the stock (100) by the flow (85), which suggests that juveniles in the facility stay an average of (100/85) months, or 36 days.

EXAMPLE 1. Calculating Length of Stay Using Stock/Flow Ratios

Stock—average daily population	300
Flow—releases during previous year	425
Stock/flow ratio in years (300/425)	0.71
Length of stay in days (0.71 x 365)	259

EXAMPLE 2. Calculating Length of Stay Using Stock/Flow Ratios

Stock—average daily population	100
Flow—releases during previous month	85
Stock/flow ratio in month (100/85)	1.18
Length of stay in days (1.18 x 30.4*)	36

* There are 30.4 days in the average month (365/12= 30.4).

3. Expected Change in Length of Stay

In addition to estimating the current length of stay, projection models need to anticipate the magnitude of future changes in length of stay. In the *Population Modeler*, this is done by estimating (in percentage terms) how much the current length of stay will increase or decrease over a particular time period. An estimate of change must be applied to every offender group involved in the projection analysis. In some projection efforts, it may be acceptable to apply the same estimate of future change to all offender groups in the population. In others, it may be important to calculate separate estimates for one or more groups. Change estimates can be based upon informed guesses, or they can be generated by statistical analysis of trends in previous lengths of stay. (See the discussion below about statistical techniques.)

4. Current Admission Rate

Every projection model needs some way to estimate the number of admissions expected to occur in the future. Users of the *Population Modeler* do this by first establishing baseline expectations. For every offender group in the forecast scenario, users must enter a current admission rate. In other words, what is the current rate at which youth from each group are being added to the population? This is the current “flow,” usually stated in terms of admissions per day, per month, or per year.

5. Expected Change in Admission Rates

Users next need to anticipate how the admission rate could change in the future. In the *Population Modeler*, this is done by entering a percentage change per time period for each offender group in the model. Users may enter a single percentage change (i.e., admissions will increase 20 percent between year 3 and year 4, then remain unchanged through year 10), or they may enter continuous change functions (i.e., admissions will increase 2 percent annually between year 3 and year 8).

The size of the change can be an educated guess, or it can be developed systematically by a deliberative process involving statistical analyses of previous admissions trends, or investigations of other factors that are related to admissions, including social conditions, policy developments, and legislative initiatives. Most forecasts should include several scenarios based upon varying assumptions about future admission rates.

INFORMING ESTIMATES WITH STATISTICAL ANALYSIS. Estimating future patterns in the use of juvenile corrections and detention facilities will never be an exact science. There are too many factors involved, including demographic influences, policy choices, management behaviors, political changes, and even broad social, economic, or cultural values. Some of these factors will always be impossible to measure accurately. Some, however, can be tracked with local, state, or national data sources that are readily available.

Juvenile justice agencies should begin their efforts to project future admissions with analyses of demographic trends, juvenile crime statistics, and juvenile justice case processing data. Increasingly, this type of information is available on the Internet, largely through the efforts of the federal Office of Juvenile Justice and Delinquency Prevention (OJJDP). Users of *Juvenile Forecaster* should also examine any similar resources that may be available through state and local agencies.

At first, analysts may need to rely on relatively simple approaches to projecting future admissions, such as tracking percentage changes in juvenile populations and arrests. Eventually, however, they should explore the availability of more complex statistical methods and devise more elaborate projection techniques. Regardless of how a jurisdiction chooses to project future admissions, the usefulness of its approach will inevitably increase over time. Local officials will gain experience in making projections and increase their knowledge about

how placement facilities and programs are actually used by the juvenile justice system.

The *Juvenile Forecaster* website provides some online assistance in estimating changes in admission rates. Help is available for analyzing population data, arrest data, and juvenile court data.

USING POPULATION DATA. The OJJDP provides online juvenile population data at the national, state, and county level. As of June 2002, OJJDP provided this information on its web site at <http://ojjdp.ncjrs.org/ojstatbb/html/POPULATION.html>. The web site includes the most recent population estimates generated by the U.S. Census Bureau organized into the age groups that are most useful to juvenile justice agencies. For any state or county, users can obtain the most recent estimates of the total population (all ages), the child population (under age 18), the youth population (ages 10 to 17), and the “juvenile” population (ages 10 through the upper age of juvenile court jurisdiction) in a particular state or county. Estimates are available for other important age groups as well, including separate data for youth ages 10 through 12, 13 and 14-year-olds, 15-year-olds, 16-year-olds, and 17-year-olds.

Users of *Juvenile Forecaster* can also visit the web site of the U.S. Census Bureau itself at <http://www.census.gov>. As of June 2002, projections for various age, sex, and race categories at the state level were available at <http://www.census.gov/population/www/projections/popproj.html>.

Of course, it would be misleading to estimate future detention or correction admissions with population trends alone. Users of *Juvenile Forecaster* should explore other sources of data with which to make these projections.

USING JUVENILE ARREST DATA. The Office of Juvenile Justice and Delinquency Prevention distributes juvenile arrest data as well. As of June 2002, this information was available at <http://ojjdp.ncjrs.org/ojstatbb/html/ARRESTS.html>.

The web site includes an “Easy Access” tool that provides arrest data collected by the FBI’s Uniform Crime Reporting program for the nation as a whole, for individual states, and for counties within each state. Due to the time required to collect and disseminate the data, users may find that the most recent arrest information online is several years old. For example, as of June 2002, the online database included arrests for the years 1994 through 1998. The comprehensiveness and accessibility of the data, however, make this site a valuable resource for forecasting.

USING JUVENILE COURT DATA. Whenever possible, projections should include data about juvenile court processing. The juvenile court is the principal gatekeeper for the bed space managed by juvenile corrections agencies. The juvenile court also usually approves juvenile detention, or at least the decision to continue detention beyond some statutorily defined limit (e.g., 72 hours). Because the juvenile court is the main access point for placement, changes in detention and corrections populations are likely to be closely related to changing court actions (rates of referral, rates of adjudication, etc.).

Most state court systems publish at least some data about delinquency case processing, often in the form of annual reports or in case handling data collected by the administrative office that oversees the courts in that jurisdiction. Forecasters should make every effort to obtain this data.

For jurisdictions not yet able to analyze their own local data, or those just getting started with a forecasting effort, there are also national data about juvenile court processing. The Office of Juvenile Justice and Delinquency Prevention provides juvenile court processing data in an online data dissemination tool, “Easy Access to Juvenile Court Statistics,” developed by the National Center for Juvenile Justice. As of June 2002, OJJDP provided juvenile court data at <http://ojjdp.ncjrs.org/ojstatbb/html/COURT.html>. The web site provides national delinquency case

processing data collected by the National Juvenile Court Data Archive. The data can be broken into individual offense and demographic categories as well as being separable into the major steps of the juvenile justice process.

The databases of the National Juvenile Court Data Archive are also used to create the annual OJJDP publication, *Juvenile Court Statistics*, which is a good resource for projecting future admissions into juvenile justice populations. *Juvenile Court Statistics* provides readers with general trends in court referrals and the case dispositions that result from those referrals.

Statistical Techniques

Despite the importance of collecting and analyzing quantitative data, users of *Juvenile Forecaster* should recognize the limits of statistical analysis in projecting juvenile corrections populations. Experienced juvenile justice professionals know instinctively that the use of secure confinement does not go up or down in direct proportion to crime rates, population trends, or juvenile court adjudication rates. Yet, they are often encouraged to rely on simplistic forecasting models that assume exactly that.

Effective population forecasting models should incorporate more than statistical analysis of arrests and population. The most effective models will also include a wide range of other factors such as political developments, legislative choices, judicial preferences, and local programming values. If projection models include these factors, forecasting models can be more than simplistic, numbers-driven exercises that are obsolete almost as soon as they are finished. They can develop into flexible tools that increase one's understanding of how policy and program choices affect the use of secure bed space.

Therefore, users of *Juvenile Forecaster* should try to develop estimates of future change that are informed by quantitative analysis but do not rely exclusively on statistics and data trends. Statistical results should always be reviewed by informed decisionmakers, and the data points

entered into *Juvenile Forecaster* should reflect their administrative judgment and policy expectations.

Moreover, even the best forecasts should be revisited on a regular basis. An agency's policy environment and operational context are constantly changing. All forecasts should be recalculated routinely and they should be reviewed closely any time there are significant changes or new developments in areas related to the assumptions used in a forecast.

For more information about the proper role of statistical analysis in population forecasting models, see OJJDP (2001).

Logging In

Log-in Screen Options

When users open up or click on the *Population Modeler*, they see the following areas of a log-in screen:

USER NAME. *Population Modeler* allows projection scenarios to be saved for future use. Scenarios are stored under a user name provided at the beginning of each user session. There are no restrictions on the format of this name. Users may want to use their full name or initials, the name of their state or local agency, or any combination of formal names, agency names, the month or year of the forecast, etc.

Users of the *Population Modeler* may also want to maintain more than one user account with separate user names, but it is important to remember which names have been chosen in the past. If a user forgets his user name, he may place the cursor in the user name box, hit the down cursor key, and a list of recently entered user names will appear.

PASSWORD. An optional password may be entered to protect the data associated with each user name. If this field is left blank, anyone that knows a particular user name will be able to access the information associated with that name.

NEW USER. When a user logs in for the first time to the *Population Modeler*, he or she should check this option to register a new user name and to begin creating the first projection scenario associated with that user name.

RETURNING USER. If users have previously logged in to the *Population Modeler*, they may want to check this option to open the last projection scenario used under a particular user name, or they may want to enter a new user name and log in as if for the first time, thus creating a new database of projection scenarios, unrelated to their previous work.

OK. Press OK to begin creating a projection scenario or to work with previously created scenarios.

CANCEL. Press Cancel to return to the *Population Modeler* main page.

Creating Offender Groups

The population to be modeled must be divided into meaningful groups. This is done with “factors” and “categories.”

Factors and Categories

Offender groups are defined with factors and categories. Factors are used to divide the population into groups. Categories are the subgroups that make up each factor. Examples of factors that might be used to divide an offender population into groups could include gender, age, offense, and security level. As shown below, there may be several different ways of measuring the categories for some factors.

Factors	Example categories
Gender	Male or female
Age	Under 16 or 16 and older Ages 12–15, 16, or 17
Offense	Felony or misdemeanor Violent or nonviolent Person, property, drug, or other
Security level	High-risk or low-risk Secure or nonsecure

Users of the *Population Modeler* may begin by entering the names of each analysis factor to be used in a particular projection scenario. An example, offense type, is the default for the first factor. This may be overwritten with a new factor chosen by each user.

There are two options for creating offender groups in *Population Modeler*.

Using Standard Factors

Check this option to define offender groups using standard factors such as offense type, gender, age group, or risk. Remember that each projection scenario will require all of the data elements needed by the *Population Modeler* for each of the factors and categories used to make up offender groups.

Using Your Own Factors

Users may need to divide the population into nonstandard groups depending on the needs of their particular agency or their particular forecasts. Some agencies, for example, may wish to divide forecast populations into groups such as youth with legislatively defined minimum lengths of stay versus youth whose lengths of stay are within the discretion of the agency. Others may want to divide offenders according to source of payment for placement or other services. The choice of offender groups is completely up to the user.

Offender groups may be created simply by entering a name for each group, without using standard factors and categories, but keep in mind that users will still need to obtain data or create

separate estimates for the starting populations, admissions rates, lengths of stay, and expected changes for every offender group created.

COMMON FACTORS AND CATEGORIES. If a user is having trouble thinking of the most useful set of offender groups for a specific population projection, the *Population Modeler* includes a list of commonly used factors and categories that can be used to begin creating groups.

Select a label from the list and press the ← button beside a factor or category to copy the label to the specified destination.

Note: Race and ethnicity are not included in the list of common factors. Although race is a basic demographic variable in research, its use in population projections is not justified since these factors and categories should be related to appropriate decisions regarding placement settings and security levels.

ADD CATEGORY. Click here to add a new category value to the end of the list.

REMOVE CATEGORY. This option deletes the category currently selected.

PREVIOUS FACTOR. Go to the previously defined factor—or to the **Log-in** page if currently on the first factor.

NEXT FACTOR. Click on this button when ready to create another factor.

DONE. Create a new population projection scenario based on the factors as defined.

CANCEL. Return to the **Log-in** page without creating a projection scenario.

Defining Scenarios

Once all of the offender groups for a population projection have been created and named, users must define or name the projection scenario itself.

Scenario Name

Each projection scenario must have a unique name. The name of a scenario can be whatever a user wants it to be. In combination with the previously entered **User Name**, the name of the projection scenario will be used to organize and store the projection data on the *Juvenile Forecaster* web site. Scenario names may be chosen to describe certain factors or assumptions involved in the projection model. For example, scenarios may be named

- bed space in large counties;
- worst-case scenario 5 to 10 years;
- statewide secure care forecast; or
- detention bed needs in two years.

When creating a scenario for the first time, it must have a new name. If a user is looking at scenarios created in previous sessions, the names of these existing scenarios will be displayed in a box from which a user may select a scenario and view its parameter values. Users may add characters to existing scenario names to alter their meaning and then resave them under the new name. Both scenarios would be available for future population projections.

New Scenario Based on Previous One

Check this option to create a new projection scenario with the same offender groups and data as another scenario already stored by *Population Modeler*. This option is useful for defining “what if” scenarios. Users can, for example, quickly create a set of scenarios in which population and admissions data are identical, but length of stay remains constant in one, increases by 2 percent a year in another, and increases by 5 percent a year in a third.

Scenario Description

A description window is provided for each projection scenario. This window may be used to record additional information about a scenario. For example, users may wish to note the rationale for assumptions about future trends as reflected in the projection scenario, or this

window could be used to add interpretations or reactions to the results of the projection.

The scenario description window may be especially useful for those who wish to share the results of a projection scenario with others in their agencies or jurisdictions. By giving colleagues the URL for *Juvenile Forecaster* (<http://jf.urban.org>) and a user name and password to log in with, it would be possible to have others interested in a projection to log in and view the results. The scenario description window could be used to leave notes and observations for others about the validity of the assumptions involved in the scenario, the policy implications of the results, etc.

Time Period

Admission rates may be measured and stated in three different time periods—years, months, or days. *Population Modeler* automatically adjusts its forecasting equations to accommodate any chosen time period. Thus, if a user enters the number 55 in the box labeled “Admissions per Time Period,” and the radial button for “Day” is selected just above the box, it is assumed that the user intends to record that 55 youth per day are admitted to the population.

Note: The choice of forecasting time periods also affects the way a user must enter data for expected changes in admissions and lengths of stay.

Periods to Calculate

Enter a number for the time horizon the forecast should span. If “Year” is chosen as the time period for a projection scenario, entering the number 10 will calculate a forecast that spans 10 years into the future. If the time-period “Day” is selected, entering the number 10 in this box will generate a forecast that extends just 10 days into the future.

Expected Changes in Admissions and Length of Stay

Before estimating the extent of future changes in admission rates and lengths of stay, users should review the earlier sections of this

manual for topics related to the use of statistical analyses in forecasting efforts. Additional help is available online through the hyperlinks provided in the *Juvenile Forecaster* web site.

Once future change estimates have been derived by a combination of statistical analysis and group discussion, click on the “Set” buttons next to each offender group and select among several options:

- No change;
- Change of **X** percent at a single point of time (time period 1, 2, 3, etc.)
- Change of **X** percent at each time period, beginning with time **A**.
- Change of **X** percent at each time period, beginning with time **A** and ending at time **Z**.

Be careful to click on the “Save Changes” button to ensure that all of the choices made are reflected in the projection scenario when it is calculated.

Modifying Offender Groups

After defining a projection scenario, users may still change the offender groups included in the projection.

ADD GROUP. Add a new offender group to the end of the list.

REMOVE GROUP. Delete the group currently selected.

COPY PREVIOUS VALUE. When entering data for each offender group, users may avoid typing similar figures repeatedly. Click on the “Copy Previous Value” button to insert whatever number is typed in the cell above the one in which the cursor is currently located.

Running the Projection Model

SAVE. Click this button when data entry is finished.

The projection scenario and all the data associated with it will be saved under the current user name and it will be available for later use.

RUN MODEL. Calculate the projection and view the results in graphic or tabular form.

CANCEL. Return to the **Home** page or **Log-in** page without running the projection model.

Equations for Population Modeler

Population projections for time t are calculated for each offender group using the following equation:

$$P(t) = A(t) \cdot L(t) \cdot \left(1 - e^{-\frac{1}{L}(t)}\right) + P(t-1) \cdot e^{-\frac{1}{L}(t)}$$

The first term represents juveniles admitted between time $t-1$ and time t , and the second term represents members of the population at time $t-1$ who have not been released by time t .

The population at time 0 is simply the initial, or starting population, parameter. Admissions are assumed to be a *Poisson* process, and individual lengths of stay are assumed to have an exponential distribution. (See the papers cited below for more detailed descriptions.)

In *Population Modeler*, admissions and length of stay can vary over time. $A(t)$ is the admissions rate at time t . This is Ae^{rt} , where r is the percent change in admissions during a time period of analysis divided by 100. If the percent change is 0, this is simply the constant value A .

Similarly, $L(t)$ is the length of stay at time t . This is Le^{st} , where s is the percent change in length of stay divided by 100.

Note that in the papers cited below, the equation is given in a nonrecursive form with admissions and length of stay constant:

$$P(t) = A \cdot L + (P - A \cdot L) \cdot e^{-t/L}$$

If length of stay in this equation is simply replaced by a function of length of stay over time, the result will overestimate population when length of stay is increasing and underestimate it when length of stay is decreasing. The recursive form must be used to model lengths of stay that change over time.

A critical factor in determining the reliability of these forecasts is the number of offenders released during the forecast period. Each release is a statistical event, and the more releases that happen during the forecast, the more reliable the estimate. Thus, forecasts over more time periods will be more accurate than forecasts over fewer time periods, keeping all other parameters constant. Likewise, forecasts with larger initial populations or larger rates of admission will be more accurate than will those with smaller values for those parameters.

Reliability is measured by calculating the relative error. The standard deviation is equal to the square root of the number of offenders released during the forecast period. This can be more conveniently expressed as a percentage of relative error by dividing it by the total number of releases.

A relative error of 2 percent means that a user can be 95 percent confident that an actual detention population described by the forecast parameters will end up within 2 percent of the forecast results—assuming that the parameters used in the projection scenario were correct.

Reliability of forecast results is fundamentally dependent on the assumptions defined by the user in the forecast parameters. The accuracy of these must be determined by the user. Relative error measures do not and cannot calculate this.

Glossary for Population Modeler

Rate of admissions, admissions per time period	Admissions to a facility or program population. Stated in terms of juveniles per day, per month, or per year, depending on the time period used in a projection scenario. Separate admission rates must be available for every offender group in a projection scenario.
Length of stay	The length of time juveniles remain in a population after being admitted, measured as the number of days between admission and release. A separate measure for average length of stay must be available for every offender group in the projection scenario.
Offender group	Classifications used to disaggregate an offender population into smaller subpopulations based on factors such as type of offense, demographic characteristics, or security and treatment concerns. Creating separate forecast parameters for each group (e.g., different lengths of stay, different admission rates) results in more detailed and more useful population projections.
Periods to calculate	The number of days, months, or years for which a projection should be run. For example, a projection scenario may forecast offender populations 10 days, six weeks, or two years into the future. Facilities with relatively long lengths of stay often calculate forecasts in terms of years, while facilities with shorter lengths of stay (e.g., juvenile detention centers) may find it more useful to create forecasts weeks or months into the future.
Starting population	The number of juveniles currently in a facility or program for which a population projection is to be calculated. Ideally, this would be the actual number of juveniles in the population as of the exact time of the forecast. More realistically, however, it is often the most recent count of the population (the first of the month, the last day of the previous quarter, etc.). <i>Juvenile Forecaster</i> requires a separate count for each offender group in the projection. If an actual count is not available, users must devise an estimate.
Time period	The period of time used to define the parameters of a projection scenario, either days, months, or years. For example, the rate of admissions to a detention center may be defined as 10 youth per day, while the rate of admissions to a correctional facility may be more usefully defined as 1,300 youth per year.

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CASEFLOW SIMULATOR

CaseFlow Simulator is a separate component of *Juvenile Forecaster*. With this tool, users can examine the effect changes in juvenile justice case processing could have on the number of youth that enter out-of-home placement, probation, or other programs. Users can create their own case processing patterns based upon state or local data, or they can adapt national patterns from OJJDP's *Juvenile Court Statistics* series.

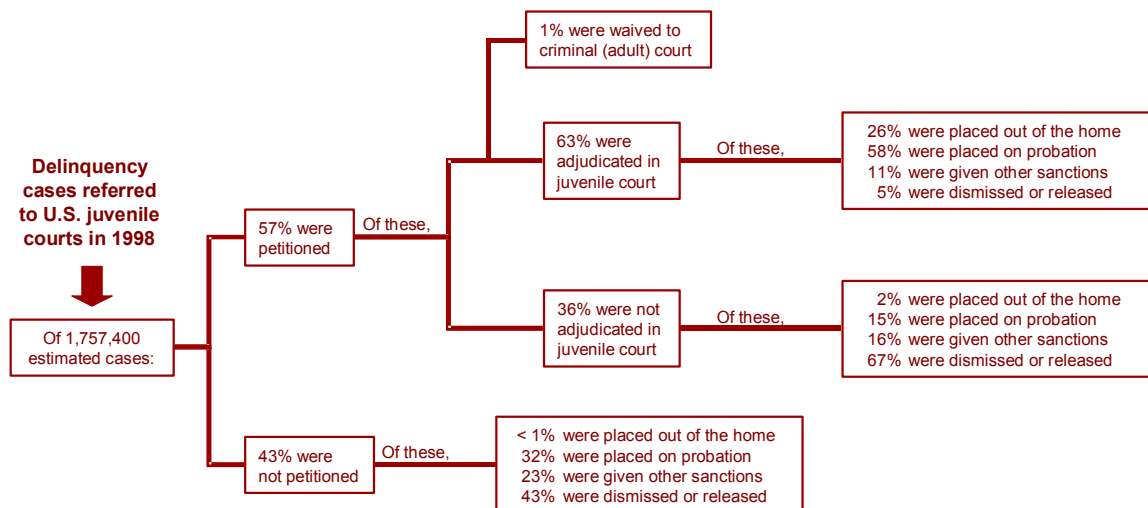
For example, users may believe the percentage of delinquency cases formally charged by prosecutors in their jurisdiction is about to change due to new legislation. Using *CaseFlow Simulator*, they can model the effect that such a policy change might have on the number of juveniles entering residential facilities in the future based upon recent case patterns in their own jurisdiction or nationally.

The case processing measures used in *CaseFlow Simulator* are based upon the generic caseflow model used in OJJDP's *Juvenile Court*

Statistics series, where delinquency cases received by the juvenile court are first reviewed for legal sufficiency and a charging decision is made, followed by adjudication and disposition decisions.

While few jurisdictions may use case processing terminology exactly as presented in *CaseFlow Simulator*, the generic caseflow model incorporates the critical stages of most juvenile justice systems. The generic caseflow model does not distinguish among types of out-of-home placement. Thus, the percentages reported for out-of-home placement in *CaseFlow Simulator* include nonsecure and secure facilities. Users should keep this fact in mind as they inspect the possible effects of changes in the juvenile justice case processing patterns.

Changes in Caseflow Affect How Many Youth Are Placed out of the Home



Source: National Center for Juvenile Justice, Pittsburgh, Pennsylvania.

Logging In

When users click on or open up *CaseFlow Simulator*, they will see the following areas of the log-in screen:

USER NAME. The name under which the next caseflow scenario will be saved.

PASSWORD. Users may enter a password to protect the caseflow data in each scenario. If no password is used and the field is left blank, anyone knowing the user name will be able to access the information associated with that name.

NEW USER. Check this option to register a new user name and begin creating the first caseflow scenario associated with that name.

RETURNING USER. Check this option to open the last caseflow scenario used under the current user name.

OK. Press OK to open the *CaseFlow Simulator* worksheet.

CANCEL. Press Cancel to return to the *Juvenile Forecaster* main page.

Using the Worksheet

After logging in, users will see the following options on the *CaseFlow Simulator* worksheet:

DELETE USER NAME. Click to delete the current Juvenile Forecaster account, together with any caseflows or forecast scenarios associated with that name.

TYPE OF CASE. The name of the currently selected caseflow. To view another caseflow, select it from the combo box.

TOTAL CASES RECEIVED. The number of cases entering the juvenile justice system per month or per year.

SAVE AS NEW CASEFLOW. Saves the percentages listed under “Future Value” as a new caseflow that can be retrieved later.

After clicking this button, users will be asked to give the new caseflow a name. Each name must be unique. Press “OK” to create the new caseflow, or “Cancel” to return to the current caseflow.

UPDATE. Makes the percentages listed under “Future Value” the “actual value” percentages for the current caseflow.

DELETE. Deletes the current caseflow.

FUTURE VALUE. Change the percentages in this column to see how they affect caseflow outcomes relative to the default or actual percentages. Percentages in each category must add to 100 percent or a warning message will appear at the bottom of the window.