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Manning Levels and Alternative Sea Manning Concepts: Historical Evidence From Deployment Cycles

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Outline

- **Background**
- The databases
- Manning variation over the IDTC
- Turnover during the IDTC
- Conclusions

The Navy is adopting alternatives to traditional deployment plans to provide a surge capacity with greater flexibility and more constant readiness. In addition, optimal manning strategies are leading to smaller crews that require that all critical billets be filled. These initiatives, along with a human resource strategy that emphasizes a smaller and more experienced force, will require substantial corresponding changes in personnel systems. This study was done for N1's Strategic Planning and Analysis Office, with Pers-40 as the point of contact.

In this annotated briefing, we will first present some background on this study, then describe the databases we constructed to analyze how manning on board ships changes as they move from deployments through their maintenance and training workup cycles. We will then present the results of analyzing these data in two sections. The first considers levels of manning over the Interdeployment Training Cycle (IDTC). The second section of analytical results focuses on the number of new Sailors joining the ships' crews at different points in the IDTC. Finally, we draw some conclusions from our analyses.

What are alternative sea manning concepts?

- Increased surge capability: Fleet Response Plan (FRP)
- Greater forward presence: alternative crewing concepts
- Optimal Manning (OM) in operational units

Many changes have already been made to the way the Navy employs its fleet, and more are being planned. They are based on having a more constantly ready, agile force, with more forward presence. Also, there is a belief that manpower costs can be reduced by finding the optimal billet structure for operational units.

Reference [1], another paper from this study, documents many of the alternative sea manning concepts (ASMCs) and initiatives that are already in place or that are being experimented with or anticipated. Increased surge capability is in place with the Fleet Response Plan, which is discussed in [2 and 3].

There have been numerous experiments and initiatives with alternative crewing concepts, from submarines with Blue and Gold crews to the recent Sea Swap experiments to the anticipated 4 crews to 3 ships for the Littoral Combat Ships (LCSs). All of these, OM experiments and initiatives and the relevant references, are summarized in [1].

…And what are their consequences for manning levels?

- ASMCs mean personnel system must have right person in right place at right time
  - FRP requires more level readiness over IDRC
  - Longer periods of time when ship must be ready to deploy at short notice
- Common perception is that, in the past, ship manning followed a "bathtub" pattern
  - High during the deployment
  - Fell rapidly upon return
  - Very low during the time between deployments
  - Climbed during training for next deployment
- If this is true, it would conflict with level readiness needed for FRP

FRP, OM, and Sea Swap are going to make it harder for the personnel system to always have the right person in the right place at the right time. FRP means that readiness must be maintained at more constant levels over more of the Interdeployment Readiness Cycle (IDRC), so new Sailors must be available to fill losses as soon as possible. OM means that crews are reduced to lower sizes in which each member is more critical; again, losses are harder to tolerate. Sea Swap programs, because of their constant rotations, may put extra stress on crews and call for backups to replace members who need breaks. For all these reasons, programs that would put extra personnel at the ready are being developed in the fleets [1].

The idea behind FRP is that the fleet will be in a greater state of readiness over more of the IDRC. In particular, out of a 27-month notional IDRC, ships are deployed for 6 months and must be ready to deploy at short notice for 11 of the 21 months that they are back in homeport (the emergency surge, surge ready, and routine deployable phases) [2]. In the traditional deployment patterns, the notional Interdeployment Training Cycle (IDTC) was 24 months, 6 months of which ships were deployed. After the deployment, readiness dropped and Sailors were not expected to deploy again until the beginning of the next IDTC [3]. Thus, the FRP increases the mission intensity of careers because it increases the proportion of time that Sailors are in a state of readiness awaiting a possible deployment.

A common perception is that manning follows a “bathtub” pattern over the deployment cycle. That is, manpower, as well as its associated experience and training, is allowed to shift over the IDTC in a way that would not support level readiness. In particular, the number of Sailors on a ship would be high during a deployment, fall rapidly when the ship returned to homeport, stay low during the maintenance period in the middle of the IDTC, and then climb again as the ship trained for its next deployment. Obviously, if this happens and manning is very low during the middle of IDTCs, it will be difficult to switch to the FRP model or to similar constant-readiness models.

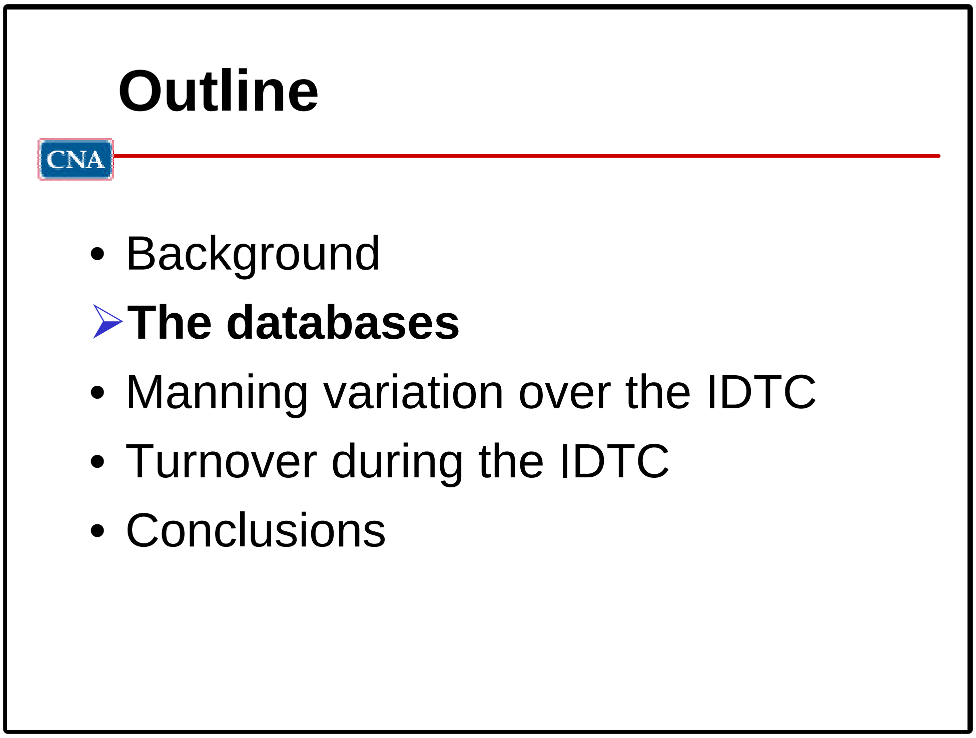
We created a deployment cycle/ manning history database for analysis

- Ship deployment/personnel database going back to 1982
  - Allows us to see if common perceptions are true
  - Provides a baseline from which to compare recent flexible deployment schedules
- What is the correct metric?
  - Level: we used personnel level because it allows longer histories, and numbers of bodies vs. billets are stable within ship class and time period
  - Turnover: we used new crew reporting since this measures lack of training readiness

CNA's holdings of ship employment histories and personnel inventories allow us to document historical manning levels over Interdeployment Training Cycles as far back as 1982. We can examine manning patterns at various levels of detail by ship type and other variables. This will allow us to determine whether there have been major differences by ship class or changes over time and will provide a baseline from which to compare recent flexible deployment schedules.

We chose to measure manning levels by looking just at the number of bodies on ships rather than a measure of bodies relative to billets. We did this for two reasons. One was simply that we have longer holdings of data on bodies, so we could assemble a more extensive database. The other reason is that, when comparing manning levels over an IDTC, it is relatively rare for the number of billets on the ship to change during that period. If billets are constant, the absolute number of bodies tells you just as much as bodies relative to billets.

There are a number of ways to measure turnover on ships, but we chose to simply look at the number of new Sailors reporting to the Unit Identification Code (UIC) over a specified period of time. This should provide a measure of how many people on board are not acclimated and trained.



We now describe how we constructed the databases we used in our analyses.

The deployment database

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- From CNA's ship employment schedule data, we constructed observations on ships with two consecutive deployments
- Each observation has ship type, hull number, deployment year, fleet, days deployed, days between deployments, and dates when the original deployment started/ended and the next deployment started
- We made the following exclusions:
  - Ships homeported overseas
  - 57<days deployed<=400
  - 100<=days between deployments<=1,460 (4 years)
  - Ship types with 5 or fewer observations
- Final data set has 1,984 observations from 1982-2003, for 26 ship types

CNA has been receiving data extracts from the Ship Employment Histories, or Ship Employment Schedules (EMPSKDS), since 1982 and maintains an archive of these data. Dates of deployments are indicated down to the day. The deployment year we use is the calendar year from the first day of the ship's deployment.

Restricting the sample by excluding ships that have one deployment but not a follow-on deployment eliminates roughly 16 percent of the sample.

We removed ships homeported overseas by matching ships to enlisted personnel data and looking at sea/shore rotation codes. A sea/shore code equal to "4" is sea duty homeported overseas; this eliminated roughly 4 percent of the sample.

The official definition of a deployment is being away from homeport for 57 or more days. About 5 percent of our observations were at sea for less than 57 days and were excluded. Only a few outliers had very long deployments of more than 400 days once ships homeported overseas were removed.

Removing very short and very long interdeployment periods also eliminated about 5 percent of the sample, about equally from both ends of the distribution.

We eliminated several ship types because they had only a few observations. The remaining ship types in the database are shown in a backup slide.

We were able to compare our deployment histories for carrier battle groups with a history maintained by CNA analyst RADM McCaffree, USN (Ret.), from published sources. Our dates coincided closely with his.

The manning database

- For each deployment/interdeployment period observation, we merged in monthly manning data
  - Enlisted Master Record (EMR)
  - Officer Master File (OMF)
- Difficult to compare observations because lengths of deployments and IDTCs vary
  - Initial look broke up IDTC into four periods
    - First 3 months back from deployment
    - Middle period of interdeployment period (at least 3 months)
    - First 3 months of training workup
    - Second 3 months of training workup
  - IDTC must be at least 12 months long
- This briefing examines total enlisted manning
- "Training" periods defined only by inference

At this point, we have monthly inventory data for enlisted and officers, for each deployment observation, for each month of the deployment and the interdeployment period. We merged in the personnel data from CNA's holdings of the EMR and the OMF. We used personnel data rather than a ratio of personnel to billets for two reasons. First, our billet data are available only back to the early 1990s, so using personnel data provides a longer time series. Second, the number of billets per ship rarely changes during a deployment, so levels of absolute manning should follow the same pattern as the percentage of billets that are filled.

In this briefing, we look only at total enlisted manning. Given our database, it would be possible to analyze subsets of enlisted, such as particular occupations or paygrades. We also have data on officer manning. Given the small absolute and percentage variations in total enlisted manning over the deployment cycle, however, finer detail may not be practical.

Some standard analytical tools are difficult to use on this data set because the amount of data (i.e., number of months' worth) varies between observations due to different lengths of deployments and IDTCs. We believe, however, that we can present a very clear picture of manning over the IDTC using a rather simple technique.

We further restricted our sample to observations with a long enough IDTC to observe three distinct phases, which might allow us to see a bathtub pattern. The first phase was an initial time after returning from the deployment. We looked at both the first month back and an average of the first 3 months; there was little difference, so we chose the average of the first 3. Then, we wanted to look at the training workup for the subsequent deployment. This is supposed to take about 6 months, so we broke it into two 3-month periods and averaged manning over each of these. Finally, we wanted a maintenance period in the middle of the IDTC that was at least 3 months long. Here we averaged however many months were left after taking off the 3 at the beginning and 6 at the end, but it had to be at least 3.

Notice that we are defining periods of maintenance and training workup by inference only. Although the Ship Employment Histories define periods of deployment precisely, they are not detailed enough to let us identify specific periods of maintenance and training. We are simply assuming that the last 6 months before a deployment are spent in some type of training activities. Also, we divide the rest of the IDTC into a period immediately following the return from the deployment (first 3 months back) and then the rest of the deployment. In the traditional IDTC, it would have been typical for major preplanned maintenance availabilities to occur during the period in the middle of the IDTC, but we have no direct data on this.

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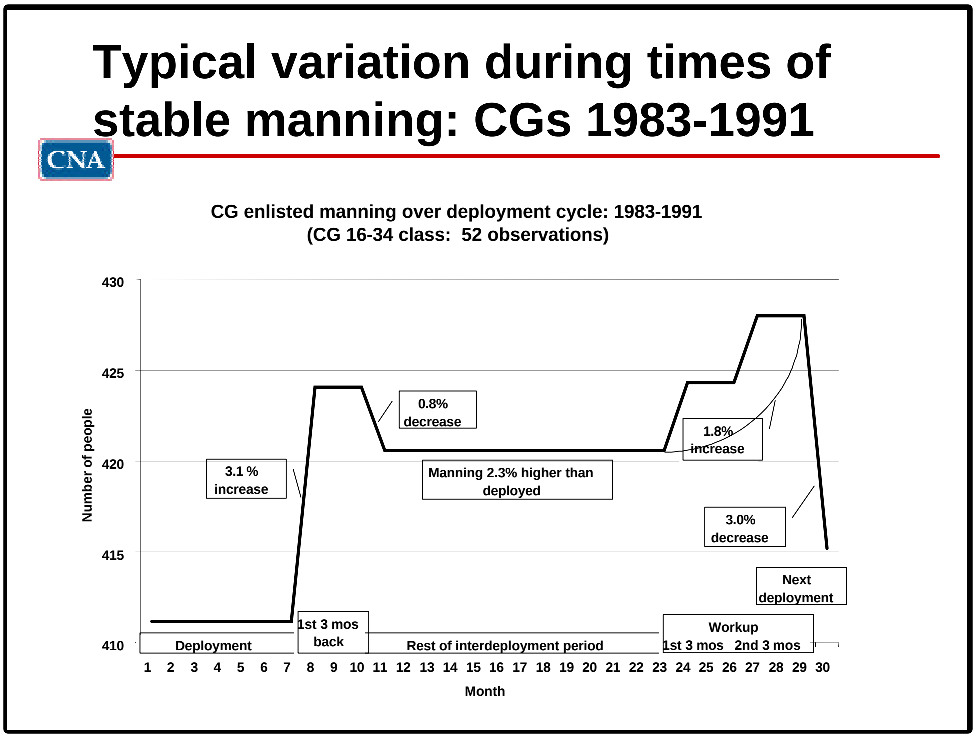
We now present our first set of results on how total enlisted personnel inventories change over various points in the deployment cycle.

In this section, we present charts for only some of the ship types that are representative of the patterns we observe across all of the ship types we analyzed. More charts are included in the backup section.

The scale of the charts in this section will differ depending on the size of the ship, but it is not the absolute levels of manning that are of interest. Instead, our focus is on finding patterns in how manning varies over deployment cycles.

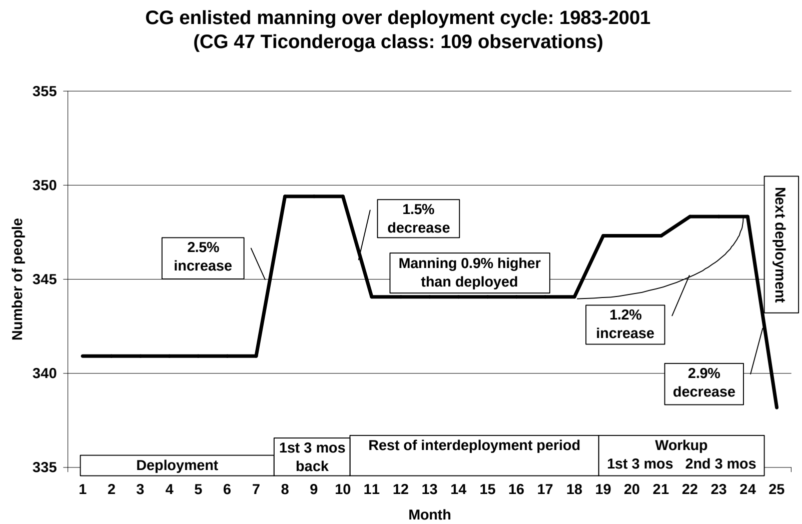


In constructing these graphs, the length of the deployment is set equal to the average deployment for all the observations in the group. The length of the middle of the IDTC, or the rest of the interdeployment period, is set equal to the average length of the interdeployment period for all the observations in the group, less 9 months. Those 9 months are the first 3 months back, the first 3 months of the training workup for the next deployment, and the second 3 months of the training workup. Again, the training period is defined only by inference as the last 6 months of the interdeployment cycle. We have no information from the ship employment histories to indicate that the ships are in training during this time.

These are the older cruisers with deployments in the 1990s. Overall personnel inventory levels weren't changing much, as can be seen by the similarity between levels from one deployment to the next. In such cases, the common pattern is for manning to rise when ships first return, somewhere from 2 to 3 percent. Then manning falls again somewhat, but remains from 1 to 2 percent above manning during the deployment. Then manning will rise again during the 6-month workup period, usually by 1 to 2 percent. Finally, there is a drop in personnel inventories just before deployment of around 2 percent or more.

Notice that these changes are quite small. On average, these cruisers had just over 410 Sailors on board during the deployments; during the 13 months in the middle of their nondeployed time, it was just over 420. So, the 2.3-percent difference was 10 out of a crew of 420.

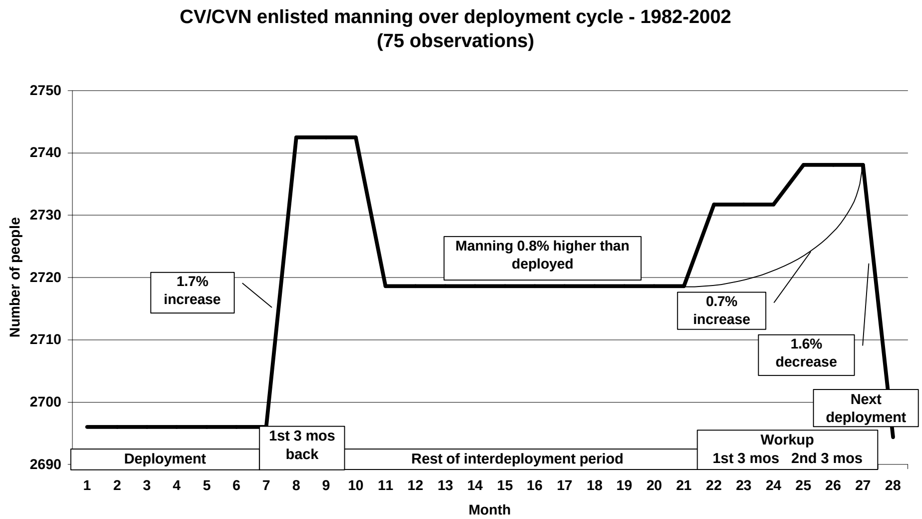
Ticonderoga class cruiser: similar pattern in more recent years



This manning pattern holds over more recent years, too, although it is often hard to find ship classes that have personnel inventories that are stable enough to see any pattern due to IDTCs.

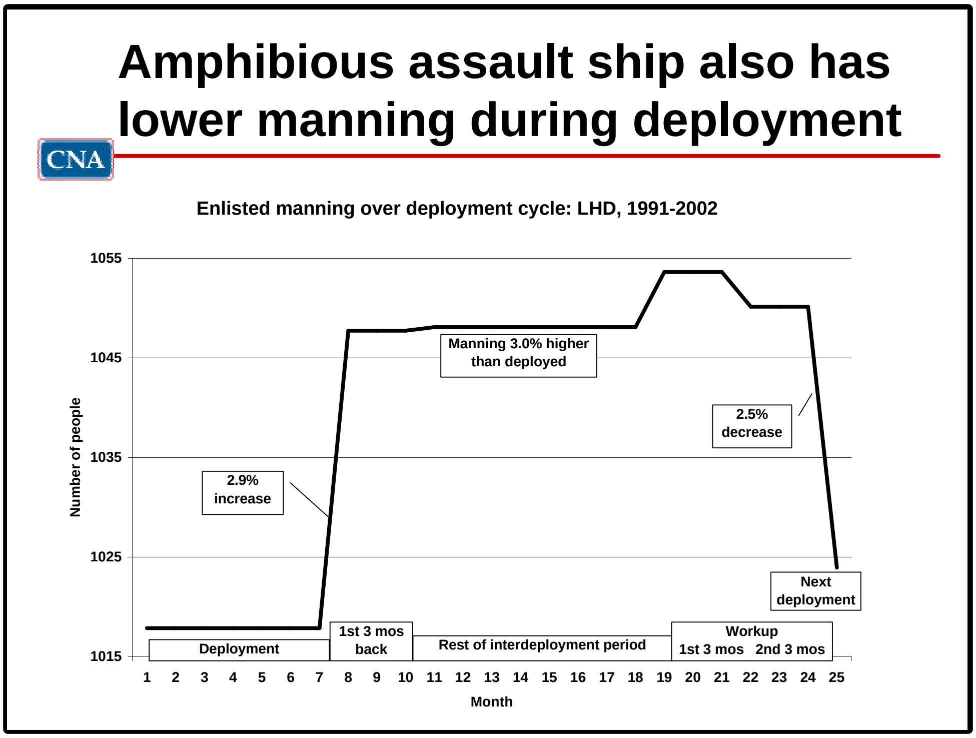
One example is the Ticonderoga class, or CG 47, cruiser shown here with 109 observations from 1983 to 2001. Unlike most other ship types, this class didn't have drastic changes to M+1 requirements or billets authorized (BA) over this period. Our data are on bodies—that is, the number of active-duty enlisted assigned to the cruiser at that point in the IDTC.

The carrier: larger numbers, similar pattern



The pattern for carriers is similar: the crew size increases when the ship returns to the dock after the deployment, then falls slightly during the middle months of the deployment, rises again for the training workup, and then falls when the ship deploys.

Notice again that the changes are small both in absolute numbers and in percentages.



This chart simply shows a similar pattern for a larger ship of a different type.

The sample is 18 ship deployments from 1991 to 2002. Manning on these ships was fairly stable over time, with four observations in 1996-1998 having slightly lower manning.

Other changes can overwhelm IDTC changes

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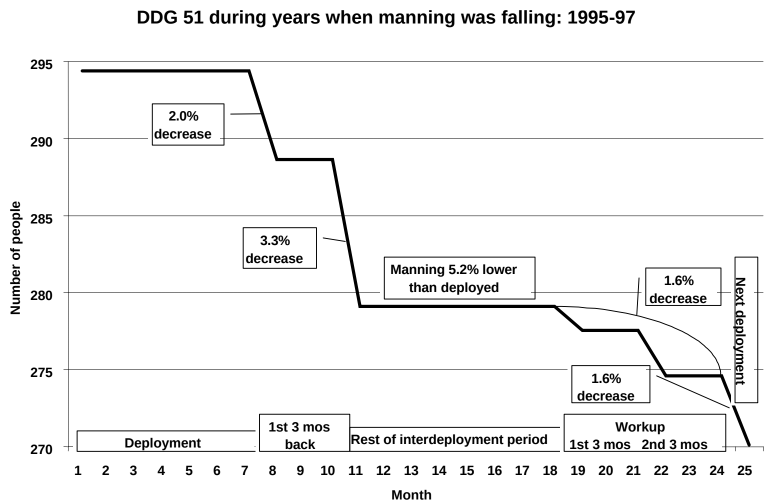
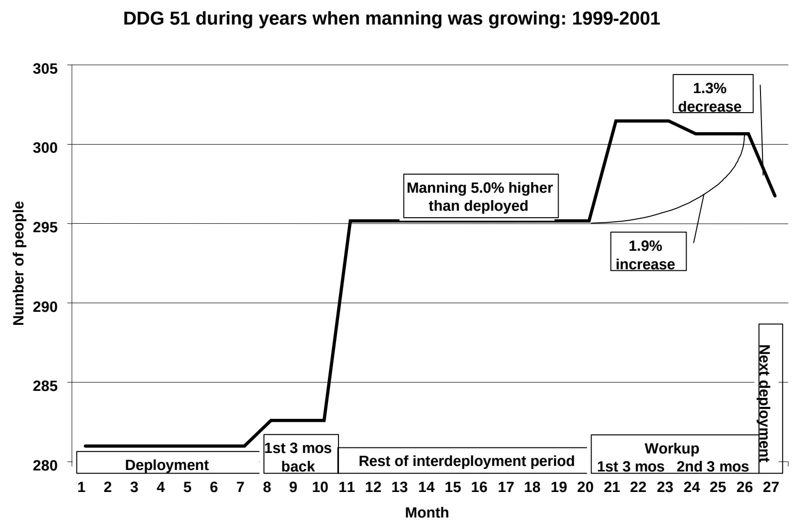


For many ship classes, changes to the requirements in their Ship Manning Documents (SMDs) or to their BA can cause much larger fluctuations in personnel inventories than changes over deployment cycles. Also, a manning crisis for the entire Navy, such as the one in 1997-1998, can produce personnel gaps at a random point in the deployment cycle.

In this example, the DDG 51 class had BA reduced by around 7 to 9 percent in the middle to late 1990s. This chart shows how that overwhelms the usual interdeployment pattern changes. This sample includes 14 observations.

The backup section has a similar chart for DDs during years of falling manning.

Manning increase from 1998 to 2002 occurs in many ship classes



After 1998, however, the recruiting and manning crisis for the Navy as a whole lessened and manning increased for several classes of ships, including the Arleigh Burke destroyers. Furthermore, BA as a percentage of requirements was increased during this period for many ship classes. This upward trend in manning overall is shown by the increase in personnel inventories from one deployment to the next. It is distinct from any pattern associated with a deployment cycle. But even here, a dropoff in inventories is evident just before leaving on the next deployment.

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This sample includes 29 observations.

The backup section has similar charts for DDs and amphibious ships in recent years with growing manning.

Two common features of personnel inventories over deployment cycles

- Personnel inventories on ships
  - Increase after returning from a deployment
  - Fall when leaving on a deployment

		Percentage of observations with manning	
Ship type	Number of observations	Increase from deploy. to 1st 3 months back	Decrease from workup to next deployment
CG	163	79	77
DDG	201	72	72
DD	178	70	79
CV/CVN	75	71	76
LHA/LHD	48	77	77

This table summarizes the two most common features of manning over deployment cycles. The sample in this chart includes all ships in these classes with deployments between 1982 and 2003.

(1) Manning usually increases after returning from a deployment. For the ship classes with the most observations, this is true for 70 to 79 percent of deployments.

(2) Manning usually falls when the ship completes training and leaves the dock for the next deployment. For the largest ship classes with the majority of the observations, this is true for 72 to 79 percent of the deployments.

Furthermore, although manning does usually fall after the initial increase when the ship reaches homeport, even after this fall manning typically remains as high as or higher than its level during a deployment. Thus, there is no evidence in our data of a "bathtub" in manning levels over the IDTC.

Even without a decline in absolute numbers of bodies over a typical cycle, there are still other manning problems that can be investigated. The most important is whether—even though there are the same number of Sailors—more new people are reporting just before the ship deploys or is called on to make a surge deployment. The next section will address this question, but first we examine two other features of the level of manning over deployment cycles.

Manning falls slightly over long interdeployment periods

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Ship type	Average enlisted manning during the middle of the IDTC			
	All deployments	Longer than ave IDTC (20 months)	Longer than 2 years	Longer than 3 years
Older DDGs	337	330 (1% lower)	330 (1% lower)	321* (5% lower)
DDG 51	288	285 (1% lower)	274* (5% lower)	N/A

*Only 6/98 obs for older DDGs and 3/60 for DDG 51

One might expect that long periods ashore would be associated with lower personnel inventories. Perhaps there would be extended maintenance availabilities with less need for people assigned to the UIC. We looked at a ship type with many observations—the DDG, with 201 observations from 1982 to 2002—and compared ships with longer IDTCs to all observations. We compared the average manning during the middle part of the interdeployment period (i.e., not the 3 months right at the beginning or the 6 months right at the end).

Average manning does fall slightly for observations with longer IDTCs, but not drastically. For the older DDG classes, for observations where the IDTC is longer than average or longer than 2 years, average manning in the middle of the IDTC falls by 7 people, or by 2 percent. For observations with IDTCs over 3 years, manning falls by 16 people, or 5 percent (this is only 6 out of 98 observations).

For the DDG 51 class, average manning in the middle of the IDTC falls by 3 people, or 1 percent, for observations with IDTCs longer than the average of 20 months. For IDTCs longer than 2 years, manning falls by 14 people, or 5 percent (this is only 3 out of 60 observations).

Is there much variation in manning during deployments?

Monthly enlisted manning during deployment

Ship type	Average manning	Percentage change from average each month					
		First	Second	Third	Fourth	Fifth	Sixth
CG	354	0.5	-0.8	-0.2	0.2	0.4	0.0
CV/CVN	2721	0.4	-0.6	0.0	0.4	0.2	-0.3
DD	296	0.8	-0.7	-0.3	0.0	0.2	-0.1
DDG	311	0.7	-0.6	-0.1	0.1	0.1	-0.2
FFG	188	0.9	-0.3	-0.3	0.0	0.0	-0.3
LHA/LHD	942	0.3	-0.9	-0.5	0.2	0.5	0.3
LPD	365	0.8	-0.1	-0.5	0.0	-0.1	-0.1
LSD	304	0.5	-0.8	-0.6	0.3	0.4	0.2

This table was constructed by taking a subset of observations that had deployments of at least 6 months so that we could see if manning changed much over the course of a deployment. We chose 6 months because the vast majority of deployments have at least 6 months.

Average manning for each month was then taken by ship type, followed by an overall average for the 6 months. From the overall average monthly manning by ship type, shown in the first column above, we computed the percentage change in each of the individual 6 months.

For all of the ship types shown, we see a similar pattern. First of all, manning never varies as much as 1 percent from the average. Given that, the pattern is that manning will be slightly higher than average the first month, dip below average the second and third months, and then settle back around the average in the rest of the months.

In terms of numbers rather than percentages, for example, on the DDG in the third through sixth months, the crew stays within –3 to +6 of its average 311-Sailor crew. Although this doesn't mean that there is no turnover, since equal numbers of people could be replacing each other, it does imply that high turnover is unlikely.

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We now present our second set of results on how crew turnover changes over the deployment cycle. In particular, we look at the percentage of enlisted Sailors who are newly assigned to the ship during various points in its deployment cycle. Reference [4] stresses the need to have people on the ship in time to make it through all the training “gates” with their crewmembers. This implies that, if there is a high proportion of new crewmembers, especially late in the training workup period, there may be a lower level of readiness for the deployment. Of course, if the trend in the future is toward more constant readiness, perhaps a constant percentage of new crew during the IDTC is desirable.

In this section, we investigate historical baselines for percentages of new crew reporting on board at different points in the IDTC.

Data definitions

- Extend our deployment and manning databases to identify Sailors who report to the ship within certain periods
- Break IDTC into six 3-month periods to compare equal time spans
  - Deployment: 1st and 2nd 3 months
  - Return from deployment: 1st and 2nd 3 months back
  - Training workup: 1st and 2nd 3 months before leaving on next deployment
- Examine DDGs and CGs
  - Large, uncomplicated samples
  - Subdivided by time periods and ship classes

We began with the deployment and manning databases described earlier and added variables that measure the percentages of Sailors who were new to the ships' crews over specified 3-month periods. We defined a "new" Sailor as one with a date of reporting to the UIC (taken from the EMR) that fell in the corresponding period relative to the date of the event in question. That is, if a ship ended a deployment in May 1994, a Sailor with a reporting date in November 1994 would be new in the second 3 months back. To take another example, if the ship's follow-on deployment started in October 1995, a Sailor reporting in September 1995 would be new in the second 3 months of the training workup.

To compare percentages of new crew, we had to consider equal time spans, so we divided parts of the IDTC into six 3-month periods. First, we divided the deployment into two 3-month periods, assuming that crew turnover would be relatively low during this time, especially in the second 3 months. Second, we divided the 6 months upon returning from a deployment into two 3-month periods. From the previous section, we know that manning levels increase in the first 3 months back, and the off-time of the IDTC would be a good time to replenish the crew, so high turnover might be expected and desirable. Finally, we took the 6 months before the ship leaves on its next deployment, the training workup, and divided this into two 3-month periods. Again, since manning levels increase during this period, it would not be surprising to find high percentages of new crew. However, high turnover may be undesirable during this period as the crew trains for deployment.

Because we made a further restriction for this analysis that deployments had to be at least 6 months long (compared with at least 57 days in the previous sample), we have somewhat fewer observations than we did for the manning level analysis.

In this quick look at turnover issues, we examined just two ship types, the DDG and CG. We chose these two because they have large samples and are less complicated by changes in requirements and authorizations than some other ships. We did try to refine our analysis by looking at subdivisions of the ship types for different time periods or when there were distinct ship classes.

Percentage of new Sailors in crew

Type of ship	Obs.	Crew size	Percentage of Sailors new to crew over 3-month periods[1]: Deployment	Return from deployment	Workup for next deployment
DDGs					
All DDGs	101	319	2.4/2.2	2.4/2.9	3.1/3.1
Older classes (1982-93)	64	337	2.5/2.4	2.5/2.6	3.4/3.4
DDG 51s					
All (1994-02)	37	288	2.2/1.8	2.3/3.3	2.5/2.5
Falling manning (1994-97)	13	283	1.6/1.7	2.2/2.1	2.4/2.5
Rising manning (1998-02)	24	292	2.5/1.8	2.3/3.9	2.6/2.5
CGs					
All CGs	126	366	2.4/2.3	2.5/2.6	3.1/3.3
CG 16-34s (1983-91)	40	420	2.6/2.5	2.6/2.8	3.5/3.6
CG 37 (1983-01)	86	345	2.4/2.2	2.4/2.5	2.9/3.1

1. Pairs of numbers separated by a diagonal are for the first 3 months and the second 3 months.

This slide presents the results of our analysis of turnover during different portions of the IDTC, as measured by new crew reporting to ships.

The first line below both DDGs and CGs gives the average across all observations for that ship type. For example, we observed 101 DDGs that had one deployment of at least 6 months, a follow-on deployment, and time between deployments of at least 12 months. These observations spanned 1982 to 2002 and had an average crew size of 319. The 2.4-percent new crew in the first 3 months of the deployment, given an average crew size of 319, would mean that between 7 and 8 new members might be expected to join the crew during that period.

The other lines below DDG and CG break the ship samples into finer detail. For the DDG, we first contrast the older DDG classes from 1982 to 1993 with the Arleigh Burke class (DDG 51s) in 1994-2002. We then subdivide the Arleigh Burkes into years when manning was falling (1994-1997) and years when it was rising (1998-2002). For the CGs, we divide the sample into the older CG classes from 1983-1991 and the Ticonderoga class (CG 37), which also appeared in 1983 but was more concentrated in later years and has a smaller crew.

In all samples, there is some evidence of differences in turnover over the deployment cycle. In particular, turnover is lowest during the deployment, especially the second 3 months of the deployment. It then, in most cases, rises again in the second 3 months after the return. The most consistent result is that there is higher turnover during the workup period. Notice, however, that none of these differences are large.

For example, the lowest turnover for the average of all DDGs is 2.2 percent during the second 3 months of the deployment. With an average crew size of 319, this is about 7 new Sailors per 3 months. The highest is 3.1 percent for both 3-month periods of the workup, which equals 10 new Sailors per 3 months.

A similar calculation for the CG is that the lowest turnover is 2.3 percent during the second 3 months of the deployment, and the highest is 3.3 percent during the second 3 months of the workup. Given the average crew size of 366, this would be 8 and 12 new crewmembers, respectively.

Whether differences in receiving new crew of 7 vs. 10 out of 319 or 8 vs. 12 out of 366 can make significant differences in training readiness would depend on the timing and what key positions are being replaced. All the historical data can tell us is that there *have* been differences, but they have been relatively small.

Looking at the smaller subsamples does not change the pattern of the results. It is still the case that the amount of new crew is usually about 1 percentage point higher during workup than during a deployment, and in between those levels in the time after returning from deployment.

Comparing the older DDGs with all DDG 51s and the CG 16-34s with CG 37s, there is some evidence that turnover at all stages of the IDTC is lower in the more recent periods, but this time the differences are even smaller.

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Manning over deployment cycles

- Other factors (requirements, BA, recruiting and retention crisis) often overwhelm changes related to deployment cycles
- Most consistent patterns
  - Manning rises upon return and falls upon departure
  - Even during middle of IDTC, manning is usually higher than when deployed
- Other factors
  - Limited evidence that manning in middle of IDTC is lower for long interdeployment periods
  - Manning fluctuates by <1% each month during deployment

We collected a great deal of historical evidence on personnel levels over the course of deployment cycles and found that, despite some distinct patterns that seem to persist over time and across ship types, they are not the expected patterns. Furthermore, they are so small that they are often overrun by other factors.

We found no evidence of a bathtub in personnel levels—that is, a shortage of bodies during the time when a ship is not deployed. This bodes well for new deployment concepts that call for more even readiness.

Instead, the most consistent patterns we found were that manning rises when a ship returns from a deployment, falls somewhat but remains higher than when deployed for the remainder of the IDTC, and then falls again when the ship deploys again.

Turnover during IDTC

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- The percentage of crew new to ship is higher during training workup, but the difference is small
- Turnover may have decreased in more recent years, but by even less
- Other measures of personnel readiness should be investigated

Our evidence does indicate that there are differences in the percentage of the crew that is new to a ship at different points in the IDTC. In particular, new assignments are lowest during the deployment and highest during the training workup for the next deployment. Yet these differences are small, amounting in most cases to only around 1 percentage point of the crew over a 3-month period.

The two ship types we examined, the DDG and the CG, showed some decreases in turnover, as measured by percentage of new crew, between older classes in 1982-1993 and newer classes concentrated in the mid-1990s to 2002. These decreases, however, were even less than the differences between points in the IDTC.

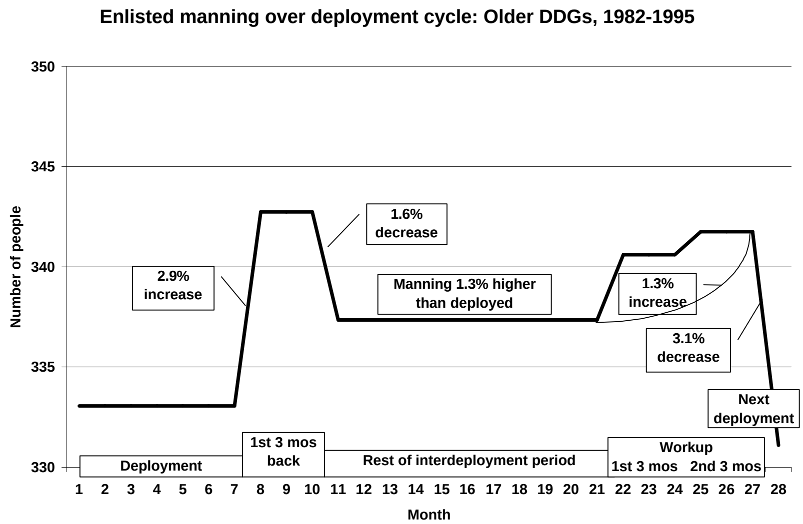
Our results tend to indicate that manpower levels and amounts of experienced crew have historically remained fairly constant over deployment cycles. Given perennial discussions and anticipated problems with manning readiness, though, it may be well to continue to delve into this issue. We could not measure several aspects of manning and turnover with our data. For example, billets that are temporarily gapped when someone goes on leave or goes to short-term training do not show up on the EMR. In addition, the rate of new assignments to the ship is only one possible measure of turnover (or churn); others could be investigated.

Backup

Ship types in the deployment database

AD	CG	LKA
AE	CGN	LPD
AFS	CV/CVN	LPH
AO/AOE	DD	LSD
AOR	DDG	LST
AR/ARS	FF	MCM
ATF	FFG	MCS
BB	FFT	PC
	LHA/LHD	TAFS

Older DDG classes: 1982-95



All DDG 51s: combines years of rising and falling manning

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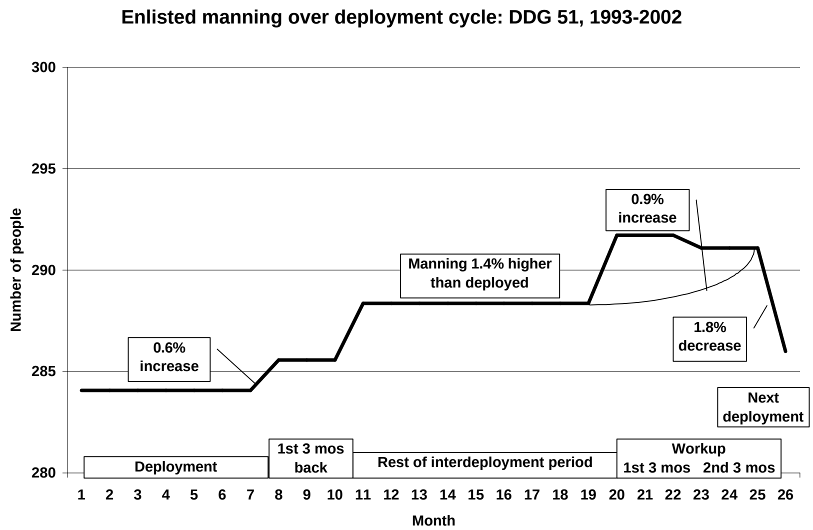
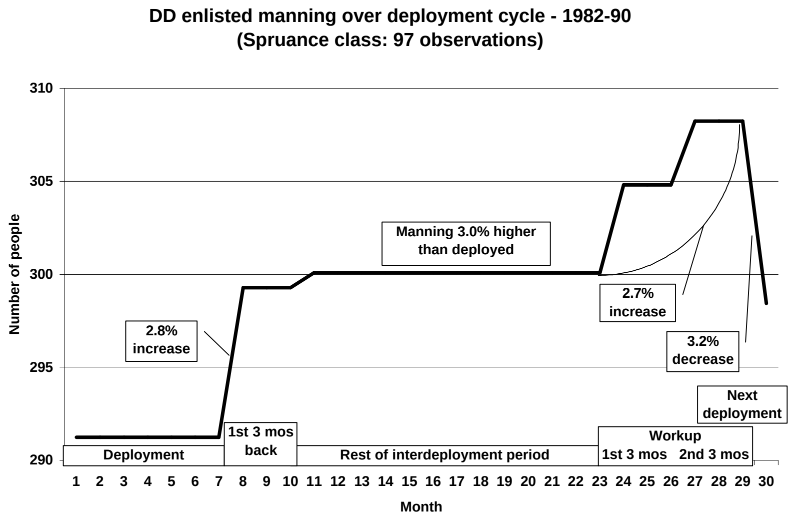
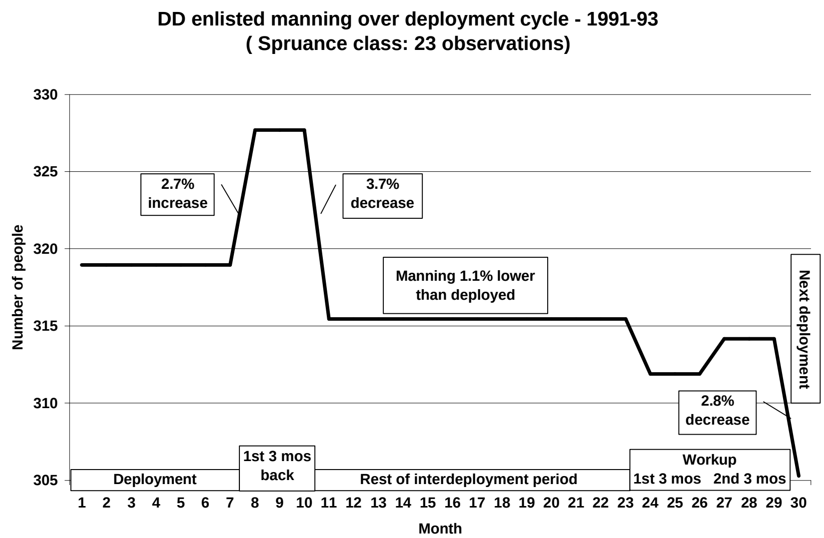


Spruance manning: early period

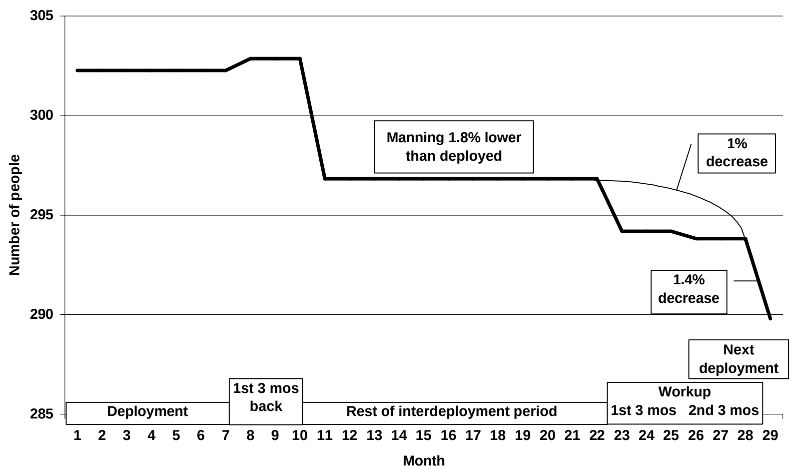


Spruance manning: transition period



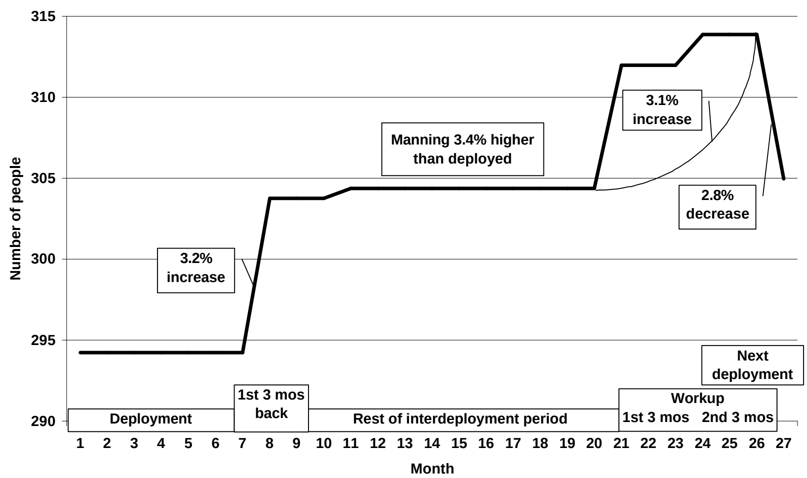
Spruance manning: shrinking years

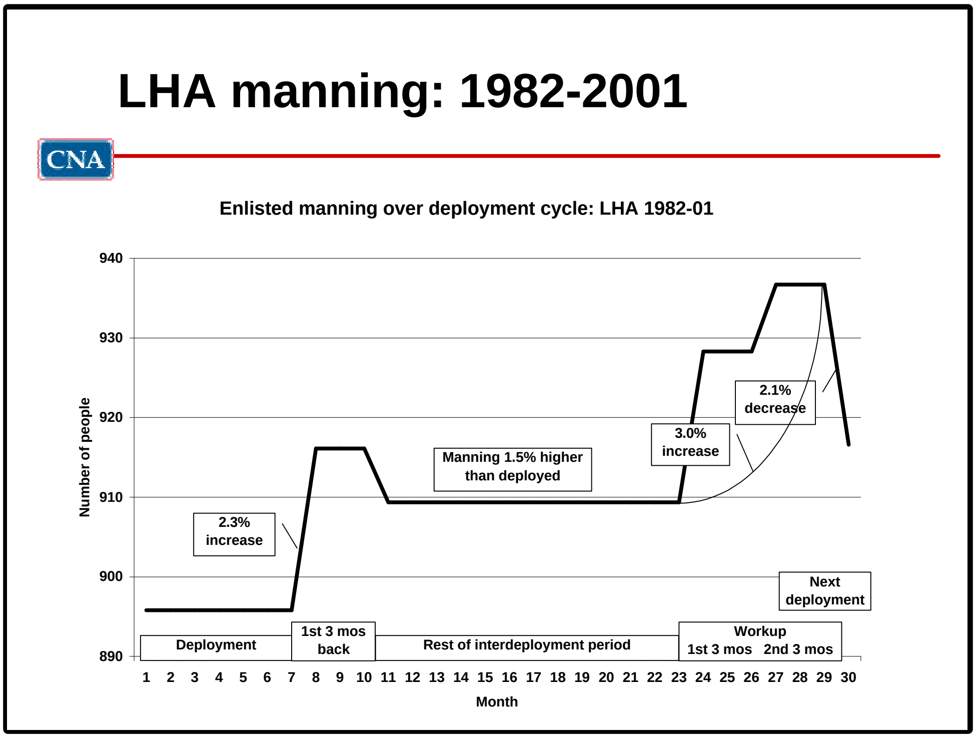
DD (Spruance) during years when manning was falling: 1994-97



Spruance manning: growth years

DD (Spruance) during years when manning was growing: 1998-01





Many of the 30 observations for the LHA had growing manning, as can be seen by the second deployment having higher manning than the first.

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