

II. Russian nuclear forces

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As of January 2019, Russia maintained a military stockpile of approximately 4330 nuclear warheads.¹ About 2500 of these were offensive strategic warheads, of which nearly 1600 were deployed on land- and sea-based ballistic missiles and at bomber bases. Russia also possessed approximately 1830 non-strategic (tactical) nuclear warheads, all of which were in central storage sites.² An estimated additional 2170 retired warheads were awaiting dismantlement, giving a total inventory of approximately 6500 warheads (see table 6.3). In line with the reductions required by the 2010 Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START), in February 2018 Russia reported that it had 1444 deployed warheads attributed to 527 deployed strategic launchers.³ The number of deployed warheads reported under New START differs from the estimate presented here because weapons deployed at bomber bases are not counted under the treaty.

Strategic bombers

Russia's Long-range Aviation Command operates a fleet of approximately 13 Tu-160 (Blackjack), 30 Tu-95MS16 (Bear-H16) and 25 Tu-95MS6 (Bear-H6) bombers. Not all of these are fully operational and some are undergoing various upgrades. The maximum possible loading on the bombers is around 785 nuclear weapons but since only some of the bombers are fully operational it is estimated that the number of assigned weapons is smaller—around 615—of which approximately 200 might be stored at the two strategic bomber bases: Engels in the Saratov oblast and Ukrainka in the Amur oblast. Modernization of the bombers, which includes upgrades to their avionics suites, engines and long-range nuclear and conventional cruise missiles, is well under way, although slower than planned. It seems likely that nearly all of the Tu-160s and some of the Tu-95s will be upgraded to maintain a bomber force of perhaps 50–60 operational aircraft. The upgraded bombers are capable

¹ The data presented in this section is based on assessments by the author.

² For a recent overview of Russia's nuclear weapon storage facilities see Podvig, P. and Serrat, J., *Lock Them Up: Zero-deployed Non-strategic Nuclear Weapons in Europe* (United Nations Institute for Disarmament Research: Geneva, 2017).

³ Russian Ministry of Foreign Affairs, 'Foreign Ministry statement', 5 Feb. 2018. For a summary and other details of New START see annex A, section III, in this volume. See also chapter 7, section II, in this volume.

Table 6.3. Russian nuclear forces, January 2019

All figures are approximate and are estimates based on assessments by the author. Warhead totals and subtotals are rounded to the nearest 5 warheads.

Type/ Russian designation (NATO designation)	No. of launchers	Year first deployed	Range (km) ^d	Warhead loading	No. of warheads ^b
Strategic offensive forces					2 500^c
<i>Bombers</i>					<i>615^e</i>
Tu-95MS6 (Bear-H6)	50/68 ^d 14/25	1981	6 500– 10 500	6 x AS-15A or AS-23B ALCMs, bombs	84
Tu-95MS16 (Bear-H16)	25/30	1981	6 500– 10 500	16 x AS-15A or AS-23B ALCMs, bombs	400
Tu-160 (Blackjack)	11/13	1987	10 500– 13 200	12 x AS-15B or AS-23B ALCMs, bombs	132
<i>ICBMs</i>					<i>1 165^f</i>
RS-20V (SS-18 Satan)	318 46	1992	11 000– 15 000	10 x 500–800 kt	460
RS-18 (SS-19 Stiletto)	20	1980	10 000	6 x 400 kt	120
RS-12M Topol (SS-25 Sickle)	63 ^g	1985	10 500	1 x 800 kt	63
RS-12M2 Topol-M (SS-27 Mod 1/silo)	60	1997	10 500	1 x 800 kt	60
RS-12M1 Topol-M (SS-27 Mod 1/mobile)	18	2006	10 500	1 x (800 kt)	18
RS-24 Yars (SS-27 Mod 2/ mobile)	90	2010	10 500	4 x (100 kt)	396
RS-24 Yars (SS-27 Mod 2/silo)	12	2014	10 500	4 x (100 kt)	48
RS-26 Yars-M (SS-X-28)	..	(2018)	5 500+	MIRV (. . kt)	..
RS-28 Sarmat (SS-X-29)	..	(2020)	10 000+	MIRV (. . kt)	..
<i>SLBMs</i>					<i>720^h</i>
RSM-50 Volna (SS-N-18 M1 Stingray)	10/160 ^h 1/16	1978	6 500	3 x 50 kt	48
RSM-54 Sineva (SS-N-23 M1)	6/96	1986/2007	9 000	4 x 100 kt	384
RSM-56 Bulava (SS-N-32)	3/48	2014	>8 050	6 x (100 kt)	288
Non-strategic forces					1 830ⁱ
<i>ABM, air/coastal defence</i>					<i>385</i>
53T6 (SH-08, Gazelle)	68	1986	30	1 x 10 kt	68
S-300/400 (SA-20/21)	1 000 ^j	1992/2007	..	1 x low kt	290
3M-55 Yakhont (SS-N-26)	48	(2014)	400+	1 x (. . kt)	24
SSC-1B (Sepal)	8	1973	500	1 x 350 kt	4
<i>Air Force weapons^k</i>					<i>540</i>
Tu-22M3 (Backfire-C)	340 100	1974	..	3 x ASMs, bombs	300
Su-24M/M2 (Fencer-D)	120	1974	..	2 x bombs	120
Su-34 (Fullback)	110	2006	..	2 x bombs	110
MiG-31K (Foxhound)	10	1983	..	1 x ASM	10
<i>Army weapons</i>					<i>85^l</i>
Tochka (SS-21 Scarab)	160 12	1981	120	(1 x 10–100 kt)	5

Type/ Russian designation (NATO designation)	No. of launchers	Year first deployed	Range (km) ^a	Warhead loading	No. of warheads ^b
Iskander-M (SS-26 Stone)	132	2005	350 ^m	(1 x 10–100 kt)	66
9M729 (SSC-8)	16	2016	2 350	1 x . . kt	16
<i>Navy weapons</i>					820
Submarines/surface ships/air			LACM, SLCM, ASW, SAM, depth bombs, torpedoes ⁿ		
Total stockpile					4 330
Deployed warheads					1 600 ^o
Reserve warheads					2 730 ^p
Retired warheads awaiting dismantlement					2 170
Total inventory					6 500

. . = not available or not applicable; () = uncertain figure; ABM = anti-ballistic missile; ALCM = air-launched cruise missile; ASM = air-to-surface missile; ASW = anti-submarine warfare; ICBM = intercontinental ballistic missile; kt = kiloton; LACM = land-attack cruise missile; MIRV = multiple independently targetable re-entry vehicle; NATO = North Atlantic Treaty Organization; SAM = surface-to-air missile; SLBM = submarine-launched ballistic missile; SLCM = sea-launched cruise missile.

Note: The table lists the total number of warheads estimated to be available for the delivery systems. Only some of these are deployed and they do not necessarily correspond to the New START data counting rules.

^a Aircraft range is for illustrative purposes only; actual mission range will vary according to flight profile and weapon loading.

^b The number shows the total number of available warheads, both deployed and in storage, assigned to the delivery systems.

^c Approximately 1600 of these strategic warheads are deployed on land- and sea-based ballistic missiles and at bomber bases. The remaining warheads are in central storage.

^d The first number is the number of bombers estimated to be counted as deployed under New START. The second number is the total number of bombers in the inventory. Because of ongoing bomber modernization, there is considerable uncertainty about how many bombers are operational.

^e The maximum possible loading on the bombers is more than 785 nuclear weapons, but since only some of the bombers are fully operational, it is assumed here that only 615 weapons are assigned to the long-range bomber force, of which approximately 200 might be stored at the two strategic bomber bases. The remaining weapons are in central storage facilities.

^f These ICBMs can carry a total of 1165 warheads but it is estimated here that they have been downloaded to carry just over 860 warheads, with the remaining warheads in storage.

^g The number is uncertain because several SS-25 garrisons are upgrading to the SS-27 Mod 2.

^h Two of the Delta nuclear-powered ballistic missile submarines (SSBNs) are in overhaul at any given time and do not carry their assigned nuclear missiles and warheads. It is possible that only one Delta III is operational.

ⁱ Non-strategic nuclear warheads are not deployed with their delivery systems but are kept in a central storage facility, according to the Russian Government. Some storage facilities are near operational bases.

^j There are at least 80 S-300/400 sites across Russia, each with an average of 12 launchers, each with 2–4 interceptors. Each launcher has several reloads.

^k The numbers show total nuclear-capable aircraft but only some of them are thought to have nuclear missions. Most can carry more than one nuclear weapon. Other potential nuclear-capable aircraft include the Su-25 Frogfoot and the Su-30MK.

^l This estimate is based on a revision of the author's assessment in *SIPRI Yearbook 2018*. The new lower estimate is based on adjusted assumptions about warhead allocation. However, the author estimates that the number of warheads is increasing due to the deployment of additional launchers.

^m Although many unofficial sources and news media reports state that the SS-26 has a range of nearly 500 km, the US Air Force National Air and Space Intelligence Center (NASIC) lists the range as 350 km.

ⁿ Only submarines are thought to be assigned nuclear torpedoes.

^o The deployed warhead number in this table differs from the number declared under New START because the treaty attributes a fictive number to bombers and does not count weapons at bomber bases or cover non-strategic weapons.

^p Reserve warheads include the 1830 non-strategic warheads in central storage.

Sources: Russian Ministry of Defence, various press releases; US Department of State, START Treaty Memoranda of Understanding, 1990–July 2009; New START aggregate data releases, various years; US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat* (NASIC: Wright-Patterson Air Force Base, OH, July 2017); BBC Monitoring; Russian news media; Russian Strategic Nuclear Forces website; International Institute for Strategic Studies, *The Military Balance* (Routledge: London, various issues); Cochran, T. B. et al., *Nuclear Weapons Databook*, vol. 4, Soviet Nuclear Weapons (Harper & Row: New York, 1989); *IHS Jane's Strategic Weapon Systems*, various issues; *Proceedings*, US Naval Institute, various issues; 'Nuclear notebook', *Bulletin of the Atomic Scientists*, various issues; and author's estimates.

of carrying the new Kh-102 (AS-23B) nuclear air-launched cruise missile (ALCM).⁴ A modified version of the Tu-95—scheduled to be delivered from the end of 2019—is known as Tu-95MSM.⁵ The Russian Government has also announced plans to resume production of the Tu-160 to produce up to 50 modified aircraft known as Tu-160M2, with serial production starting in the early 2020s.⁶ The additional bombers would probably replace many of the old Tu-95 (MS16 and MS6) aircraft and provide a bridge to the future next-generation bomber, a subsonic aircraft known as PAK-DA, which is scheduled to begin fielding in the late 2020s and will eventually replace all Tu-95s and Tu-160s as well as the Tu-22s that are deployed with non-strategic forces (see below).⁷

Russian strategic bombers continued long-range operations over the Arctic, Atlantic and Pacific oceans in 2018, including a visit by two Tu-160s to Venezuela in December.⁸ Another notable bomber operation conducted in 2018 was the launch of 12 Kh-101 (AS-23A) ALCMs from a Tu-160 bomber

⁴ Interfax, [In 2018 the nuclear triad in Russia was enforced with five strategic bombers], 23 Dec. 2018 (in Russian); and Ashley, R., Director, US Defense Intelligence Agency, Statement for the Record: Worldwide Threat Assessment, Armed Services Committee, US Senate, 6 Mar. 2018, p. 12.

⁵ Interfax, [Tupolev received a state contract for the deep modernization of the Tu-95MS strategist], 13 Aug. 2018 (in Russian).

⁶ Russian Ministry of Defence, [The entire fleet of strategic bombers Tu-160 in the coming years will be replaced by modernized missile carriers], 16 Nov. 2017 (in Russian).

⁷ TASS, [Secrets of the PAK DA and Tu-160M2: What the winged shield of Russia will be], 22 Dec. 2017 (in Russian).

⁸ Russian Ministry of Defence, [Long-range aircraft flew from the airfields of the Russian Federation to the international airport of the Republic of Venezuela], 10 Dec. 2018 (in Russian).

over northern Russia in November.⁹ The operation was unusual due to the large number of cruise missiles that were launched.

Land-based ballistic missiles

As of January 2019, Russia's Strategic Rocket Forces—the branch of the armed forces that controls land-based intercontinental ballistic missiles (ICBMs)—consisted of 12 missile divisions grouped into 3 armies and deploying an estimated 318 ICBMs of different types and variations (see table 6.3). These ICBMs can carry a total of 1165 warheads but it is estimated here that they have been downloaded to carry just over 860 warheads, approximately 54 per cent of Russia's deployed strategic warheads. In contrast to the frequent claims in recent years about a Russian nuclear 'build-up', the US Air Force National Intelligence and Space Center (NASIC) estimates that 'the number of missiles in the Russian ICBM force will continue to decrease because of arms control agreements, aging missiles, and resource constraints'.¹⁰ Since Russia has continued to reduce its ICBM force, even though it has been below the New START limit for deployed strategic launchers for years, it remains to be seen whether and at what rate this reduction will continue in the future.

Russia's ICBM force is two-thirds through a significant modernization programme to replace all Soviet-era missiles with new types, albeit not on a one-for-one basis. The modernization programme, which started two decades ago, appears to be progressing more slowly than planned. About 70 per cent of the force had been upgraded by the end of 2018 and 76 per cent of the force is scheduled to have been upgraded by the end of 2019.¹¹ All the remaining Soviet-era ICBMs are scheduled to be withdrawn by 2024, although life extension can be expected until 2025–27.¹² In addition to the procurement of new missiles, the modernization involves substantial reconstruction of silos, launch control centres, garrisons and support facilities.¹³

Russia's current ICBM modernization is focused on the multiple-warhead version of the RS-12, known as RS-24 Yars (SS-27 Mod 2). Three mobile divisions have already been completed (Novosibirsk, Tagil and Teykovo), with two more in progress (Irkutsk and Yoshkar-Ola), and two more to begin upgrade by 2020 (Barnaul and Vypolzovo—sometimes referred to as

⁹ Russian Ministry of Defence, [In Moscow, under the leadership of the Supreme Commander of the Armed Forces of Russia, Vladimir Putin, an extended session of the Defence Ministry Board was held], 18 Dec. 2018 (in Russian).

¹⁰ US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat* (NASIC: Wright-Patterson Air Force Base, OH, July 2017), p. 27.

¹¹ Nastin, P., [The commander of the Strategic Missile Forces told about the tasks for 2019], TV Zvezda, 18 Dec. 2018 (in Russian).

¹² TASS, [In place of 'Satan': Why Russia's most powerful rockets are to be decommissioned], 12 Mar. 2018 (in Russian).

¹³ Azanov, R., 'Russia's Strategic Missile Forces as its decisive defense', TASS, 19 Dec. 2017.

Bologovsky).¹⁴ The first silo-based RS-24 regiment with 10 missiles is operational at Kozelsk and a second regiment is in the early stages of construction with 2 of 10 silos completed by late 2018.¹⁵ Russia is developing a third modification of the RS-12M, known as the RS-26 Yars-M (SS-X-28), which will be lighter than the RS-24. However, final development and deployment of the RS-26 has been delayed.¹⁶ In addition, Russia is developing a new ‘heavy’ liquid-fuelled, silo-based ICBM, known as the RS-28 Sarmat (SS-X-29), as a replacement for the RS-20V (SS-18). The RS-28 might be equipped with new types of warhead, including a new glide vehicle designed to evade missile defences. Although the new glide vehicle is often referred to as the Avangard (e.g. the United States’ Missile Defense Review 2018 lists the Avangard as a missile alongside other Russian ICBMs), it is possible that this is actually just the name of the glide vehicle’s weapon system (i.e. booster and payload).¹⁷ According to Russian reports, the glide vehicle will first be deployed in 2019 on two modified RS-18B (SS-19 Mod 4) ICBMs with the Dombarovsky missile regiment, with the aim of deploying 12 missiles equipped with the glide vehicle in two regiments by 2027.¹⁸ Once deployment of the RS-28 is under way, this missile will probably take over the glide vehicle mission from the RS-18B.¹⁹ Because of its size (4.5 meters in length, according to one report), only one glide vehicle can be carried on each missile.²⁰

Russia normally conducts two large-scale exercises with road-mobile ICBMs each year. The biannual exercises in 2018 involved RS-12M Topol (SS-25), RS-12M1 Topol-M (SS-27 Mod 1) and RS-24 mobile launchers from all the operational missile divisions.²¹ The launchers were deployed further from their bases and for longer periods than in previous years. Russian ICBMs also participated in broader strategic exercises along with nuclear-powered ballistic missile submarines (SSBNs) and bombers.²²

¹⁴ Tikhonov, A., [You won’t catch them by surprise], *Krasnaya Zvezda*, 28 May 2018 (in Russian); and RIA Novosti, [The commander of the Strategic Missile Forces announced the completion of the rearmament of the Tagil connection], 29 Mar. 2018 (in Russian).

¹⁵ Author’s assessment based on observation of satellite imagery.

¹⁶ TASS, [Source: Avangard complex replaced Rubezh in the state armament programme until 2027], 22 Mar. 2018 (in Russian).

¹⁷ US Department of Defense (DOD), *Missile Defense Review 2018* (DOD: Washington, DC, 2018), p. 7. For a history of the Avangard programme see Podvig, P., ‘Avangard system is tested, said to be fully ready for deployment’, *Russian Strategic Nuclear Forces*, 26 Dec. 2018.

¹⁸ TASS, [Source: The first Avangard complexes will be on duty in 2019], 29 Oct. 2018 (in Russian); and TASS, ‘Avangard hypersonic missile systems to enter combat duty in Dombarovsky division in 2019’, 17 Dec. 2018.

¹⁹ Kramnik, I., [What we have in Avangard: Questions about new strategic weapons], *Izvestia*, 29 Dec. 2018 (in Russian).

²⁰ TASS, [Hypersonic missile system ‘Avangard’: Dossier], 19 Jul. 2018 (in Russian).

²¹ See e.g. Russian Ministry of Defence, [The Strategic Missile Forces units work on the withdrawal of Yars missile systems to field positions], 11 Dec. 2018 (in Russian).

²² Grishchenko, N., [The mass launch of intercontinental missiles happened in Russia], *Rossiyskaya Gazeta*, 26 Oct. 2018 (in Russian).

Ballistic missile submarines and sea-launched ballistic missiles

The Russian Navy has a fleet of 10 operational nuclear-armed SSBNs (a few of which will be undergoing a refit at any given time). The fleet includes seven Soviet-era SSBNs and three (of a planned total of 10) SSBNs of a new class that will gradually replace the old SSBNs over the next decade. A former Project 941 (Typhoon) SSBN has been converted to a test-launch platform for submarine-launched ballistic missiles (SLBMs) but it is not thought to be nuclear armed.²³

The current backbone of the Russian SSBN fleet is made up of six Project 667BDRM Delfin (designated Delta IV class by the North Atlantic Treaty Organization, NATO) submarines assigned to the Northern Fleet. One Project 667BDR Kalmar (Delta III) SSBN is believed to be operational with the Pacific Fleet after completing a lengthy overhaul in 2017.²⁴

To replace the older SSBNs, Russia is building a fleet of new Borei class SSBNs (Project 955/A). Three are operational: two with the Pacific Fleet and one with the Northern Fleet. Seven more of an improved design, known as Borei-A (Project 955A), are under construction and expected to enter service between 2019 and the late 2020s. Each Borei class SSBN carries 16 RSM-56 Bulava (SS-N-32) SLBMs. It is likely that Russia aims to maintain an SSBN fleet similar in size to that of the USA.

Non-strategic nuclear weapons

As of January 2019, Russia had approximately 1830 warheads assigned for potential use by non-strategic forces. This estimate is close to the ‘up to 2000’ non-strategic warheads reported in the US Nuclear Posture Review (NPR) published by the administration of US President Donald J. Trump in 2018 (see section I). According to the NPR, Russia ‘is increasing the total number of such weapons in its arsenal, while significantly improving its delivery capabilities. This includes the production, possession, and flight testing of a ground-launched cruise missile in violation of the [1987 Soviet–US Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles (INF Treaty)]?’ (see below).²⁵

Russia’s large arsenal of non-strategic nuclear weapons chiefly serves to compensate for perceived weaknesses in its conventional forces. There has been considerable debate about the role that non-strategic nuclear weapons

²³ Saranov, V., [Decommissioning ‘Akula’: Why Russia abandons the biggest submarines], RIA Novosti, 24 Jan. 2018 (in Russian).

²⁴ Naval Today, ‘Russian nuclear-powered ballistic missile submarine Ryazan returns to service’, 16 Feb. 2017.

²⁵ US Department of Defense (DOD), *Nuclear Posture Review 2018* (DOD: Washington, DC, Feb. 2018), p. 9.

have in Russian nuclear strategy, including potential first use. For example, the NPR claims that Russia ‘threatens and exercises limited nuclear first use, suggesting a mistaken expectation that coercive nuclear threats or limited first use could paralyze the United States and NATO and thereby end a conflict on terms favorable to Russia’.²⁶ However, some commentators argue that the US Department of Defense has overstated Russia’s willingness to use such weapons.²⁷

Russia’s development of new dual-capable weapons demonstrates that it continues to see non-strategic nuclear weapons as important in its military strategy. The most significant naval development is the fielding of a nuclear version of the new long-range, land-attack Kalibr sea-launched cruise missile (SLCM), known as the 3M-14 (SS-N-30A).²⁸ While the conventional version is being fielded on a wide range of ships and submarines, although at a slower pace than originally thought, the nuclear version will probably primarily be integrated on front-line nuclear-powered attack submarines (e.g. the Akula, Oscar, Severodvinsk and Sierra classes) to replace the S-10 Granat (SS-N-21 Sampson) SLCM.²⁹ Russia is also reportedly working on an extended-range version of the 3M-14, known as Kalibr-M.³⁰

It is estimated here that Russia possesses about 820 warheads for non-strategic naval nuclear weapons, which include land-attack cruise missiles, anti-ship cruise missiles, anti-submarine rockets, depth charges, and torpedoes delivered by ships, submarines and naval aviation.

The 3M-55 Yakhont (SS-N-26) SLCM has been included in the estimate of Russia’s non-strategic forces because NASIC designates it as ‘nuclear possible’ and notes that it is used to arm submarines, ships and coastal defence units (see table 6.3).³¹ The 3M-55 is replacing the SS-N-9 (P-120), SS-N-12 (P-500) and SS-N-19 (P-700) anti-ship cruise missiles, which are dual-capable.³²

²⁶ US Department of Defense (note 25), p. 30.

²⁷ See e.g. Olikier, O., ‘Moscow’s nuclear enigma: What is Russia’s arsenal really for?’, *Foreign Affairs*, vol. 97, no. 6 (Nov./Dec. 2018); Tertrais, B., ‘Russia’s nuclear policy: Worrying for the wrong reasons’, *Survival*, vol. 60, no. 2 (Apr. 2018), pp. 33–44; and Ven Bruusgaard, K., ‘The myths of Russia’s lowered nuclear threshold’, *War on the Rocks*, 22 Sep. 2017.

²⁸ There is considerable confusion about the designation of what is commonly referred to as the Kalibr missile. The Kalibr designation is actually not a missile but a family of weapons that, in addition to the 3M-14 (SS-N-30/A) land-attack versions, includes the 3M-54 (SS-N-27) anti-ship cruise missile and the 91R anti-submarine missile. For further detail see US Navy, Office of Naval Intelligence (ONI), *The Russian Navy: A Historic Transition* (ONI: Washington, DC, Dec. 2015), pp. 34–35; and US Air Force, National Air and Space Intelligence Center (note 10), p. 37.

²⁹ Kots, A., [‘To sink ‘Nimitz’: Why the Russian submarines with cruise missiles are dangerous’], *RIA Novosti*, 28 Mar. 2018 (in Russian).

³⁰ TASS, ‘New Kalibr-M cruise missile with range over 4,500 km in development in Russia: Source’, 8 Jan. 2019.

³¹ US Air Force, National Air and Space Intelligence Center (note 10), p. 37.

³² US Navy, Office of Naval Intelligence (note 28), p. 34.

The Russian Air Force has an estimated 530 weapons for use by Tu-22M3 (Backfire-C) intermediate-range bombers, Su-24M (Fencer-D) fighter-bombers and the new Su-34 (Fullback) fighter-bomber. A new nuclear-capable air-to-surface missile (Kh-32) is in development to replace the Kh-22N (AS-4) used on the Tu-22M3.³³ The Russian Air Force is also developing a hypersonic air-launched ballistic missile, known as the Kh-47M2 Kinzhal.³⁴ In May 2018 the Russian Ministry of Defence reported that 10 MiG-31 aircraft were on 'experimental combat duty' with the Kinzhal.³⁵ In June 2018 President Vladimir Putin addressed doubts about the operational status of the Kinzhal and insisted that the missile was in service in the Southern Military District.³⁶

It is estimated that a total of around 385 nuclear warheads are in use by dual-capable S-300 and S-400 air defence forces, the Moscow A-135 missile defence system and coastal defence units (although only a small number of warheads are assigned to the coastal defence units). All these defensive systems are being modernized.³⁷

It is estimated that there are approximately 85 warheads assigned to Russian short-range ballistic missiles (SRBMs) and ground-launched cruise missiles (GLCMs).³⁸ Ground-based non-strategic nuclear forces include the dual-capable Iskander-M (SS-26) SRBM, which is replacing the Tochka (SS-21) SRBM in 10 or more missile brigades. Deployment started in 2004 and, by the end of 2018, Iskander launchers had been deployed to 10 brigades, including 5 in the Western Military District, 2 in the Central Military District and 3 in the Eastern Military District. A sixth western brigade is in the early phase of upgrading and the creation of a fourth eastern brigade is under way, which will bring the total number of Iskander brigades to 12.³⁹

Army non-strategic nuclear weapons also include a new dual-capable GLCM, known as the 9M729 (SSC-8), which is a modified version of the 9M728 (SSC-7) used on the Iskander-M system. According to the USA, the new cruise missile violates the INF Treaty.⁴⁰ Russia has rejected the accusation.

³³ US Department of Defense (note 25), p. 8.

³⁴ TASS, 'Russian Aerospace Forces test launch Kinzhal hypersonic missile', 11 Mar. 2018.

³⁵ Russian Ministry of Defence, [Experimental combat duty is carried out by 10 long-range MiG-31 interceptors with hypersonic missile 'Dagger'], 6 May 2018 (in Russian).

³⁶ Rossiya 1 TV, 'Putin dismisses doubts about Russia's new "super weapons"', 7 June 2018. Translation from Russian, BBC Monitoring.

³⁷ Novichkov, N., 'Russian defence minister summarises modernisation progress in 2017', *Jane's Defence Weekly*, 4 Jan. 2018.

³⁸ This estimate is based on a revision of the author's assessment in *SIPRI Yearbook 2018*. The new lower estimate is based on adjusted assumptions about warhead allocation. However, the author estimates that the number of warheads is increasing due to the deployment of additional launchers.

³⁹ Author's assessment based on observation of satellite imagery.

⁴⁰ US Department of State, Bureau of Arms Control, Verification and Compliance, 'INF Treaty: At a glance', Fact Sheet, 8 Dec. 2017, p. 1. For a summary and other details of the INF Treaty see annex A, section III, in this volume. On the INF Treaty controversy see chapter 7, section II, in this volume; and Kile, S., 'Russian-US nuclear arms control and disarmament', *SIPRI Yearbook 2018*, pp. 321-24.