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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604031N / <i>Large Unmanned Undersea Vehicles</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	148.268	60.446	65.672	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	274.386
2094: <i>Unmanned Underwater Vehicle</i>	148.268	60.446	65.672	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	274.386

A. Mission Description and Budget Item Justification

The Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) is the Navy's Large UUV effort as part of the Family of UUVs, in support of maintaining the Navy's undersea superiority. It is the Navy's largest Submarine-launched UUV, providing increased endurance, depth capability, and payload capacity beyond small and medium class submarine deployed UUVs. The Snakehead LDUUV will be modular in design and include high accuracy mission sensors and communications links, as well as modular payload capabilities. It is intended that modules will have well defined interfaces for the purposes of implementing cost-effective upgrades in future increments to leverage advances in technology.

The Snakehead LDUUV program is a CNO/ASN(RDA) approved Accelerated Acquisition, featuring a phased approach to grow capabilities at a manageable level of risk. Phase 1 is a Government developed prototype with significant Industry involvement to develop Techniques, Tactics, and Procedures (TTPs), Concepts of Operation (CONOPS), and risk reductions for submarine integration. One Phase 1 vehicle, with sufficient test spares, will be fabricated for integration onto Dry Deck Shelter (DDS) equipped submarines with subsystem testing commencing in FY21 and vehicle in-water testing in FY22. Future LDUUV requirements include increased capabilities and integration onto Modernized DDS, as well as integration onto surface ships. In order to support a planned competitive award to Industry, a Phase 1 Technical Data Package and a draft RFP were shared with Industry, culminating with a competitive Request for Proposal (RFP) released in Q1FY21. Phase 2 efforts were stopped in FY22.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	62.209	88.063	0.000	-	0.000
Current President's Budget	60.446	65.672	0.000	-	0.000
Total Adjustments	-1.763	-22.391	0.000	-	0.000
• Congressional General Reductions	-	-0.979			
• Congressional Directed Reductions	-	-21.412			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.763	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

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<u>Change Summary Explanation</u> Technical: Not applicable. Schedule: Not applicable. Program Changes: FY 2021: -\$1,763K Small Business Innovative Research (SBIR) FY 2022: -\$21.412K direct Congressional Reduction, -\$979K general Congressional Reduction		

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0604031N / Large Unmanned Undersea Vehicles				Project (Number/Name) 2094 / Unmanned Underwater Vehicle			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
2094: Unmanned Underwater Vehicle	148.268	60.446	65.672	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	274.386
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Snakehead Large Displacement Unmanned Undersea Vehicle (LDUUV) is the Navy's Large UUV effort as part of the Family of UUVs, in support of maintaining the Navy's undersea superiority. It is the Navy's largest Submarine-launched UUV, providing increased endurance, depth capability, and payload capacity beyond small and medium class submarine deployed UUVs. The Snakehead LDUUV will be modular in design and include high accuracy mission sensors and communications links, as well as modular payload capabilities. It is intended that modules will have well defined interfaces for the purposes of implementing cost-effective upgrades in future increments to leverage advances in technology. The Snakehead program is a CNO/ASN(RDA) approved Accelerated Acquisition, featuring a phased approach to build capabilities at a manageable level of risk in the Navy's class of Large Displacement Unmanned Undersea Vehicles.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: LDUUV Product Development	49.942	47.112	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2022 Plans: Perform Phase 1 Government testing and host submarine integration efforts completing 30% of the scheduled Phase 1 in water test events. Close out product development efforts in Q4FY22. Stopped Phase 2 efforts.					
FY 2023 Base Plans: N/A					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: Decrease of -47.112M from FY 2022 to FY 2023 due to vertical kill of LDUUV Snakehead program					
Title: LDUUV Support	2.804	6.130	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2022 Plans: Support Phase 1 fleet demonstrations and in water tests. Close out support efforts in Q4FY22.					
FY 2023 Base Plans:					

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Appropriation/Budget Activity 1319 / 4		R-1 Program Element (Number/Name) PE 0604031N / Large Unmanned Undersea Vehicles		Project (Number/Name) 2094 / Unmanned Underwater Vehicle	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
N/A					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: Decrease of -6.130 from FY 2022 to FY 2023 due to vertical kill of LDUUV Snakehead program					
Title: LDUUV Test and Evaluation					
Articles:					
	5.042	9.586	0.000	0.000	0.000
	-	-	-	-	-
FY 2022 Plans: Conduct Phase 1 test readiness reviews and fleet demonstrations and in water Government tests. Conduct shore based testing with fleet operator assistance from UUVRON. Complete 30% of the scheduled Phase 1 in water test events (initiated in FY21). Close out test efforts in Q4FY22.					
FY 2023 Base Plans: N/A					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: Decrease of -9.586 from FY 2022 to FY 2023 due to vertical kill of LDUUV Snakehead program					
Title: LDUUV Management Services					
Articles:					
	2.658	2.844	0.000	0.000	0.000
	-	-	-	-	-
FY 2022 Plans: Provide program management support and travel for the LDUUV program. Manage Phase 1 in-water test execution and fleet demonstrations. Program management plans include overall technical guidance and leadership of the program. Oversight of financial and logistics efforts and coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program. Close out program management support in Q4FY22					
FY 2023 Base Plans: N/A					
FY 2023 OCO Plans:					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)						
		FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
N/A						
FY 2022 to FY 2023 Increase/Decrease Statement: Decrease of -2.844 from FY 2022 to FY 2023 due to vertical kill of LDUUV Snakehead program						
Accomplishments/Planned Programs Subtotals		60.446	65.672	0.000	0.000	0.000
C. Other Program Funding Summary (\$ in Millions) N/A						
Remarks						
D. Acquisition Strategy Snakehead LDUUV is a multi-phased effort to design, build, and test a risk-reduction UUV followed by competitive award of a design and fabrication contract to Industry. Phase 1 is a single Government developed prototype with significant Industry involvement to develop Techniques, Tactics, and Procedures (TTP) and Concepts of Operation (CONOPS) and reduce risk for submarine integration. The Navy shared a Phase 1 Technical Data Package with Industry. A competitive Request for Proposal (RFP) was released in Q1 FY21 and a contract award was planned in early FY22 for prototyping and demonstrations of LDUUV technologies, but due to the lack of availability of funds in FY23 and out, pursue risk reduction efforts and prototyping in order to further refine future capability requirements.						

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 4				PE 0604031N / Large Unmanned Undersea Vehicles				2094 / Unmanned Underwater Vehicle							
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Industry Prototypes and Demos	Various	Various : Various	0.000	0.000		6.159	Apr 2022	0.000		-		0.000	0.000	6.159	-
LDUUV Vehicles, Hardware, Design, & Demos	WR	NUWC Newport : Newport, RI	45.260	12.500	Nov 2020	17.338	Nov 2021	0.000		-		0.000	0.000	75.098	-
LDUUV Vehicles, Hardware, Design, & Demos	C/CPFF	Various : Various	35.154	11.215	Oct 2020	1.974	Oct 2021	0.000		-		0.000	0.000	48.343	-
LDUUV Vehicles, Hardware, Design, & Demos	WR	NSWC Carderock : West Bethesda, MD	15.690	5.423	Nov 2020	3.600	Nov 2021	0.000		-		0.000	0.000	24.713	-
LDUUV Vehicles, Hardware, & Design	WR	NSWC Panama City : Panama City, FL	0.166	0.000		0.000		0.000		-		0.000	0.000	0.166	-
LDUUV Vehicles, Hardware, Design, & Demos	SS/CPFF	ARL PSU : State College, PA	22.777	8.200	Dec 2020	3.088	Dec 2021	0.000		-		0.000	0.000	34.065	-
LDUUV Vehicles, Hardware, Design, & Demos	WR	SSC Pacific : San Diego, CA	1.035	0.954	Oct 2020	0.650	Oct 2021	0.000		-		0.000	0.000	2.639	-
LDUUV Vehicles, Hardware, Design, & Demos	WR	NUWC Keyport : Keyport, WA	12.646	4.060	Nov 2020	8.165	Nov 2021	0.000		-		0.000	0.000	24.871	-
LDUUV Experimentation and Risk Reduction - Battery Certification	WR	NSWC Crane : Crane, IN	0.413	1.940	Nov 2020	2.780	Nov 2021	0.000		-		0.000	0.000	5.133	-
LDUUV Platform Integration	Various	Various : Various	0.865	5.650	Feb 2021	3.358	Feb 2022	0.000		-		0.000	0.000	9.873	-
LDUUV Risk Reduction Sonar	SS/CPFF	ARL UT : Austin, TX	0.551	0.000		0.000		0.000		-		0.000	0.000	0.551	-
Subtotal			134.557	49.942		47.112		0.000		-		0.000	0.000	231.611	N/A

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Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 4				PE 0604031N / Large Unmanned Undersea Vehicles				2094 / Unmanned Underwater Vehicle							
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LDUUV Engineering Support	WR	NUWC Newport : Newport, RI	2.236	0.400	Nov 2020	1.300	Nov 2021	0.000		-		0.000	0.000	3.936	-
LDUUV Launch and Recovery Engineering Support	WR	NSWC Panama City : Panama City, FL	0.306	0.000		0.000		0.000		-		0.000	0.000	0.306	-
LDUUV Hydrodynamics and Propulsion Engineering Support	C/CPFF	Various : Various	0.714	0.132	Nov 2020	1.255	Nov 2021	0.000		-		0.000	0.000	2.101	-
LDUUV Hull and Propulsion Engineering Support	WR	NSWC Carderock : West Bethesda, MD	2.149	0.972	Nov 2020	1.125	Nov 2021	0.000		-		0.000	0.000	4.246	-
LDUUV Command and Control Engineering Support	WR	SSC Pacific : San Diego, CA	0.930	0.450	Dec 2020	0.870	Dec 2021	0.000		-		0.000	0.000	2.250	-
LDUUV Engineering Support	SS/CPFF	APL/JHU : Laurel, MD	1.035	0.600	Jan 2021	1.130	Jan 2022	0.000		-		0.000	0.000	2.765	-
LDUUV ILS and Engineering Support	WR	NUWC Keyport : Keyport, WA	0.408	0.250	Nov 2020	0.450	Nov 2021	0.000		-		0.000	0.000	1.108	-
Subtotal			7.778	2.804		6.130		0.000		-		0.000	0.000	16.712	N/A
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FLEET Experimentation	WR	NUWC NPT : Newport, RI	0.000	4.092	Dec 2020	7.336	Dec 2021	0.000		-		0.000	0.000	11.428	-
FLEET Experimentation	SS/CPFF	ARL PSU : State College, PA	0.000	0.000		1.250	Jan 2022	0.000		-		0.000	0.000	1.250	-
FLEET Experimentation	Various	Various : Various	0.000	0.950	Oct 2020	1.000	Oct 2021	0.000		-		0.000	0.000	1.950	-
Subtotal			0.000	5.042		9.586		0.000		-		0.000	0.000	14.628	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604031N / <i>Large Unmanned Undersea Vehicles</i>	Project (Number/Name) 2094 / <i>Unmanned Underwater Vehicle</i>
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LDUUV	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
LDUUV Development																												
Experimentation Risk Reduction	Experimentation Risk Reduction and TRL Maturation																											
Design Reviews																												
Phase 1																												
Long Lead Material & Fabrication	Cont'd LLTM & Fabrication																											
Government Testing					Testing																							
Phase 2																												
RFP Release	RFP ▲																											
Source Selection	Source Selection																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604031N / <i>Large Unmanned Undersea Vehicles</i>	Project (Number/Name) 2094 / <i>Unmanned Underwater Vehicle</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>LDUUV</i>				
LDUUV Development: Experimentation Risk Reduction:	1	2021	4	2022
Design Reviews: Phase 1 Test Readiness Review	1	2022	1	2022
Phase 1: Long Lead Material & Fabrication:	1	2021	4	2021
Phase 1: Government Testing:	1	2022	4	2022
Phase 2: RFP Release:	1	2021	1	2021
Phase 2: Source Selection:	2	2021	1	2022